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ENHANCING THE INTEGRATION OF RESOURCE CONDITION MONITORING ACTIVITIES

NATIONAL SCIENCE AND TECHNOLOGY CENTER
DENVER, CO
AUGUST 17-19, 2004

Enhancing the Integration of Resource Condition Monitoring Activities
National Science and Technology Center
Denver, CO
August 17-19, 2004

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3. BLM Performance Measures
4. BLM Annual Report
5. Public Land Statistics 2003
6. Criteria and Indicators for Sustainable Rangelands, June 2003
7. The Montreal Process – Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests
8. National Assessment Prototype, June 2000
9. Sustainable Development in the United States, An Experimental Set of Indicators, December 1998
10. The Heinz Report, 2003 Updates
11. Strategic Plan for The State of the National's Ecosystems Project, 2002-2007
    Invasive Species Indicators, Land Fragmentation Indicators
12. USFS Forest Health Indicators
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13. Adaptive Management Concept Paper, April 2004
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Enhancing the Integration of Resource Condition Monitoring Activities

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Expected Outcomes

As part of the Fiscal Year 2005 budget development process, the Office of Management and Budget (OMB) asked the BLM to develop a proposed strategy to enhance the integration of our resource monitoring activities.

At the Denver meeting we will develop a proposed strategy to enhance the integration of our "land health" related data collection activities. At this workshop we will answer the following questions for each geographic scale – national, regional, and local:

- What "land health" assessments are we currently conducting? (For example, what biotic and abiotic assessments are we currently conducting at the local level?)
- What "land health" related information do we want to systematically provide to key decision makers and the general public and what will they do with it? (At the national scale, for example, what biotic and abiotic information do we want to be able to provide senior BLM leadership, the Department, OMB, the Hill, and the general public?)
- What must be done in terms of protocol refinement, data management, and applications development to develop or maintain the capability to provide the desired "land health" related information? (What assessment and reporting protocols are required if, for example, we want to be able to periodically report on the condition of riparian areas at either a regional or national scale?)
- What are the implications of this proposed approach to existing "land health" related data collection and assessment activities?

Following the workshop, we will:

- Brief the Assistant Directors on the proposed strategy to enhance the integration our "land health" related data collection activities.
- Brief OMB on our overall strategy for enhancing the integration of the BLM's monitoring activities, progress to date, and proposed next steps.
- Convene similar workshops for "heritage resources" and the other three mission areas of the Department's Strategic Plan - Resource Use, Recreation, and Serving Communities.

Proposed Agenda

Tuesday, August 17, 2004

8:00 am	Introductions
8:15 am	Review agenda, expected outcomes, and notebooks
8:45 am	Review background and proposed parameters (Handout 1)
9:45 am	Break
10:00 am	Break into 3 workgroups – national and regional, and land use plans and permits - and complete Task 1: Identify existing assessment and data collection activities at 4 levels permit, land use plan, regional, and national (Worksheet 1)
11:30 am	Break for lunch
12:30 pm	Break into 3 workgroups – national, regional, and local - and complete Task 2: Identify the information we want to be able to systematically deliver to key decision makers and the general public and what they will do with it. (Worksheet 2)
4:30 pm	Adjourn for the day

Wednesday, August 18, 2004

8:00 am	Report out and discuss the results of Task 2
9:30 am	Break into 3 workgroups - national, regional, and local - and complete Task 3: Identify what we have to do to develop or maintain the capacity to provide the information identified in Task 2 in terms of protocol refinement, data management, and/or applications development. (Worksheet 3)
11:30 pm	Break for lunch

12:30 pm	Report out and discuss the results of task 3
2:00 pm	Break into 3 workgroups - national, regional, and local - and complete Task 4: What are the implications of this proposed approach to existing "land health" related data collection and assessment activities and current reporting requirements (Worksheet 4)
4:30 pm	Adjourn for the day

Thursday, August 19, 2004

8:00 am	Report out and discuss the results of Task 4
9:30 am	Break
10:00 am	Outline and discuss overall strategy to enhance the integration of our "land health" related data collection activities.
11:00 am	Discuss next steps and evaluate the workshop
12:00 pm	Adjourn workshop

Bureau of Land Management Operating Plan 2004–2008

Our Plan

With 262 million acres of public lands–about one-eighth the area of the United States—as well as 700 million subsurface acres under its administration, the Bureau of Land Management (BLM) has an enormous responsibility. These public lands belong to all Americans and include many of the most ecologically and culturally diverse lands in Federal ownership.

The BLM is charged with sustaining the health and productivity of these lands for the use and enjoyment of present and future generations. Under its multiple-use, conservation-and-development mission, the BLM's land management responsibilities are broad, varied, and increasingly complex. Competing interests and cumulative natural resource impacts add to the growing challenge of managing these public lands.

The BLM performs a wide variety of functions in managing these public lands, including inventorying resources; preparing land-use plans and assessing environmental impacts; inspecting and enforcing use and permits; designing and constructing facilities; and restoring habitats.

All of the BLM's activities are conducted with extensive public participation, and consultation and cooperation with those most affected by our decisions. Plans and activities are also coordinated with other Federal agencies and with State, tribal, and local governments.

The BLM's operating plan for 2004–2008 establishes our long-term goals and milestones for measuring performance. It is divided into four mission areas based on those in the Department of the Interior's (DOI's) strategic plan. The BLM is the only agency in the Department that contributes to its accomplishments in each of the four mission areas: Resource Protection, Resource Use, Recreation, and Serving Communities (Figure1). Figure 2 shows how BLM funds were expended in each of the four mission areas in 2003. Each year, progress toward the goals outlined in this document will be reported to Congress and the public through the DOI's Annual Performance and Accountability Report.

July 2004

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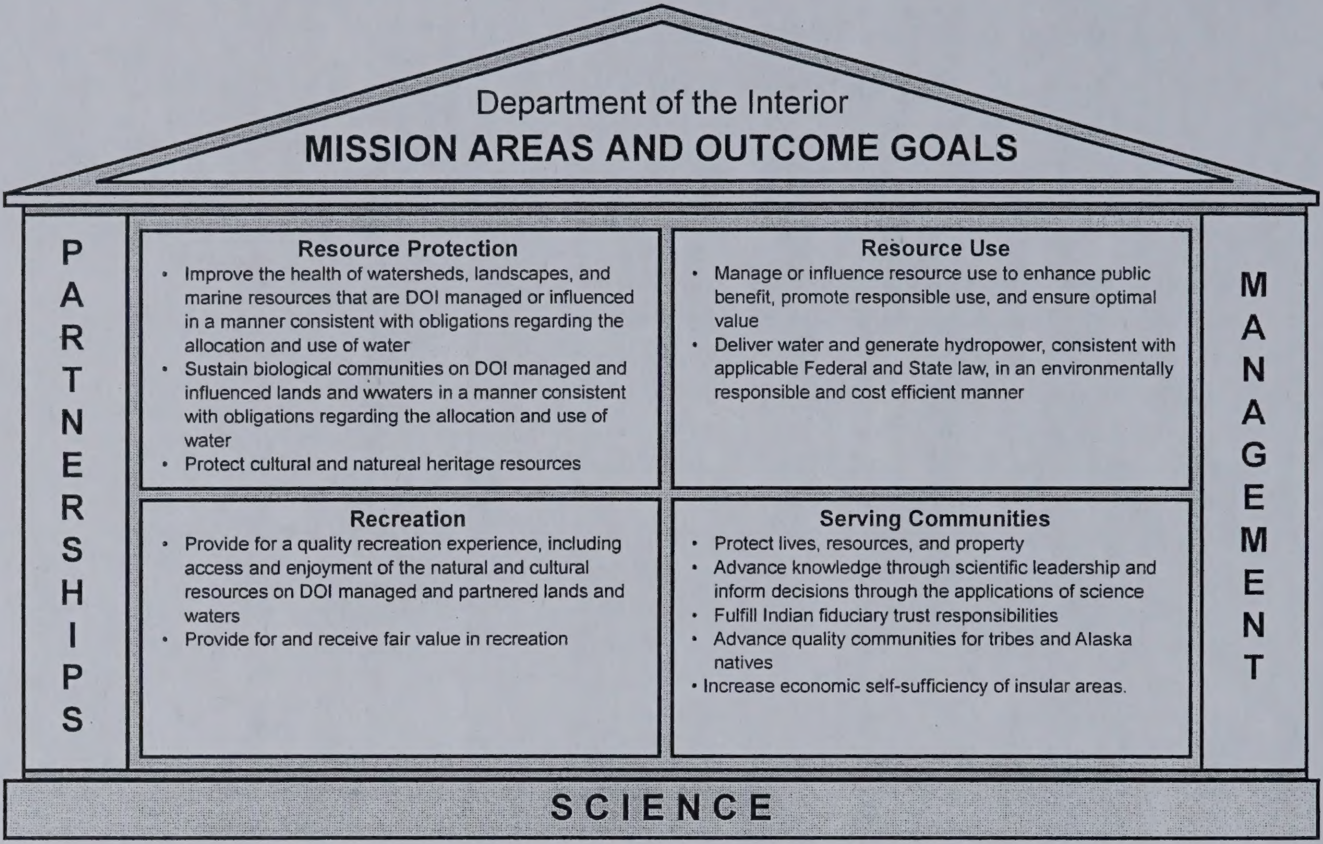

Resource Protection

- Improve the health of watersheds, landscapes, and marine resources that are DOI managed or influenced in a manner consistent with obligations regarding the allocation and use of water
- Sustain biological communities on DOI managed and influenced lands and wwaters in a manner consistent with obligations regarding the allocation and use of water
- Protect cultural and natureal heritage resources

Resource Use

- Manage or influence resource use to enhance public benefit, promote responsible use, and ensure optimal value
- Deliver water and generate hydropower, consistent with applicable Federal and State law, in an environmentally responsible and cost efficient manner

Recreation

- Provide for a quality recreation experience, including access and enjoyment of the natural and cultural resources on DOI managed and partnered lands and waters
- Provide for and receive fair value in recreation

Serving Communities

- Protect lives, resources, and property
- Advance knowledge through scientific leadership and inform decisions through the applications of science
- Fulfill Indian fiduciary trust responsibilities
- Advance quality communities for tribes and Alaska natives
- Increase economic self-sufficiency of insular areas.

Figure 1. This illustration depicts the four mission areas of the Department of the Interior and the supporting pillars of partnerships and management. Science is represented as the foundation for informed resource management decisions. (Adapted from U.S. Department of the Interior, Strategic Plan, Fiscal Year 2003-2008, September 30, 2003.)

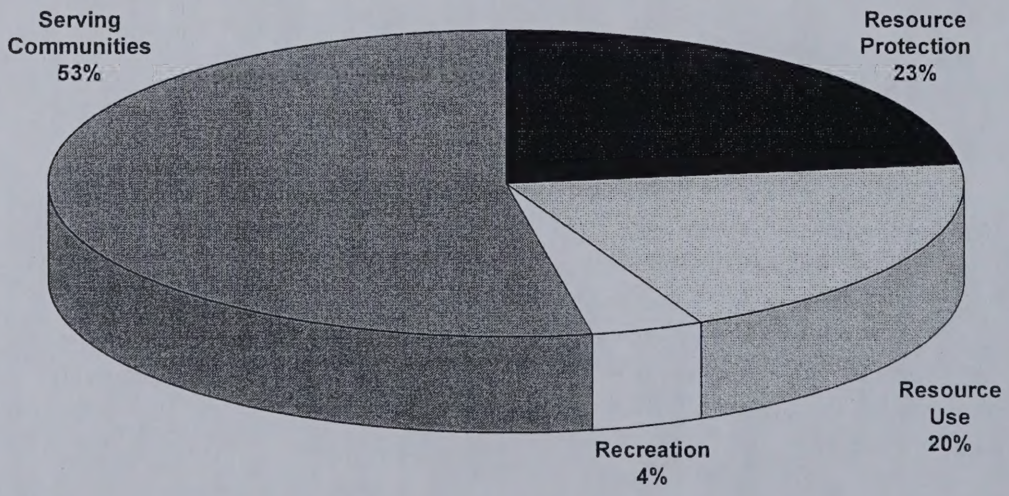

Figure 2. BLM funding expenditures by mission area in 2003.

Challenges and Opportunities

The five primary sets of challenges and opportunities that are driving the BLM's plans in 2004–2008 include the following:

- **Protect critical resources**
  Some of our Nation's most valuable public lands are at risk from past practices and current threats. By carefully identifying land management priorities, the BLM can help protect precious natural, historical, and cultural values while maintaining the health of the land. Key efforts in this area include watershed protection, weed control, and abandoned mine restoration.

- **Ensure an adequate energy supply**
  Among the Nation's most pressing concerns is reducing our reliance on foreign oil and protecting consumers from wild fluctuations in energy prices. The vast energy and mineral resources under our jurisdiction give the BLM a natural and key role in ensuring that our country has an adequate supply of energy. Equally important is our ability to deliver energy when it requires rights-of-ways across public lands. The BLM already has a significant backlog in processing right-of-way applications that threatens its capacity to respond in a timely manner to these new requests.

- **Address the needs of a changing West**
  Because of the significant pace of change and rapid growth in the American West, land-use plans for these areas, where most BLM-administered lands are located, no longer accurately reflect conditions on the ground and do not adequately address the public's emerging needs. Millions of people in rapidly growing communities are now within an hour's drive of formerly remote lands, and many of the commercial uses of public lands are vital to the economic and social well-being of these areas. As part of our work to support communities, the BLM must significantly strengthen and update its land use plans.

- **Protect special areas**
  The BLM's public lands in the West include a system of spectacular landscapes that have been designated for special management by Congress and the President. While many traditional public land uses, such as livestock grazing, hunting, and recreation will continue in these areas, there is also a high level of public interest in conserving these natural wonders. We welcome this concern and look forward to working with

Our History

The Bureau of Land Management's origins go back to the Land Ordinance of 1785 and the Northwest Ordinance of 1787. These laws provided for the survey and settlement of lands ceded by the original 13 States to the Federal Government after the Revolutionary War.

As the 19th century progressed and the Nation expanded farther west, as a result of acquisitions of property by the United States through purchase or other means, Congress enacted laws to encourage settlement and development. The creation of the first national parks and forests in the late 19th century signaled a shift in philosophy. By either reserving or withdrawing some lands from settlement, Congress legislated that they were to remain under Federal ownership and management for the benefit of all.

In the interest of resource conservation, Congress enacted a number of laws early in the 20th century to manage activities on public lands. They included the Mineral Leasing Act of 1920 and the Taylor Grazing Act of 1934. In 1946, the Grazing Service was merged with the General Land Office to form the Bureau of Land Management (BLM) within the Department of the Interior. At that time, there were more than 2,000 unrelated and often conflicting laws concerning the management of public lands. The BLM had no unified legislative mandate until Congress enacted the Federal Land Policy and Management Act (FLPMA) of 1976. This law recognized the value of the remaining public lands to the American people and declared that these lands would remain in public ownership.

Today, the BLM has about 10,000 permanent employees in over 180 locations and operates 6 national centers that specialize in training, fire management support, science and technology, human resources management, information resources management, and business services.

governmental units, businesses, conservation groups, and other interested parties in developing land-use plans for these areas.

- **Plan for a changing workforce**
During the years covered by this plan, the BLM will face a demographically shifting Federal workforce. Approximately 20 percent of our employees are eligible to retire over the next 3 years. We are now in the process of training a new cadre of employees as part of a larger effort to integrate workforce planning, technology, and human resources management into our strategic planning.

Overview of Mission Areas

Mission Area 1: Resource Protection

The health of BLM-administered lands continues to be of paramount importance. The BLM expends approximately 23 percent of its funding on its resource protection mission. Healthy lands are more resilient to environmental fluctuation and disturbance, and can better sustain resource use and recreation. Effective restoration requires complex, multi-faceted actions that may include investments in land treatment, as well as project construction and maintenance. Because knowing the existing condition of public lands is critical to implementing appropriate treatment schemes, inventorying resources is a major component of the BLM's plan.

The BLM's resource protection mission is divided into three sections: improving, restoring, and maintaining the health of watersheds and landscapes; sustaining biological communities; and protecting cultural and natural heritage resources. During the next few years, the BLM will focus it efforts on restoring and conserving sagebrush habitat, which is home to over 300 species of plants and animals, especially the sage grouse. Restoring the sagebrush ecosystem will help prevent the future listing of threatened, endangered, and sensitive plant and animal species.

The BLM will also continue to promote citizen-based stewardship of our public lands. Resource managers will look for opportunities to work with ranchers, conservationists, and other partners to achieve healthier western rangelands while providing for sustainable resource uses. Initiatives the BLM has undertaken also harness the power of partnerships in restoring and protecting our resources. By building our Challenge Cost Share (CCS), Cooperative Conservation Initiative (CCI), and Application of Science Initiative (ASI), the BLM will be able

What Drives Us

Our vision:

To enhance the quality of life for all citizens through the balanced stewardship of America's public lands and resources.

Our mission:

To sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

Our values:

To serve with honesty, integrity, accountability, respect, courage, and commitment to make a difference.

Our priorities:

- To improve the health and productivity of the land to support the BLM's multiple-use mission.
- To cultivate community-based conservation, citizen-centered stewardship, and partnership through consultation, cooperation, and communication.
- To respect, value, and support our employees, giving them resources and opportunities to succeed.
- To pursue excellence in business practices, improve accountability to our stakeholders, and deliver better service to our customers.

to leverage resources to benefit the public lands. The Healthy Forests Initiative focuses on reducing the risk of catastrophic fire by thinning undergrowth to restore the health of ecosystems in priority locations that are selected through a collaborative process with Federal, State, tribal, and local officials and communities.

Finally, the BLM will focus on managing wild horse and burro populations, whose numbers are having a detrimental impact on public land resources. Proper management will ensure that these herds can survive on the range without having a negative impact. Many of these wild horses and burros are captured and adopted out through the BLM's adoption program. The Eastern States Office alone has placed approximately 17,000 wild horses and burros in good homes over the past 5 years.

Improve, restore, and maintain the health of watersheds and landscapes

Some of the most challenging areas for the BLM are wetlands and the regions adjacent to flowing or standing water, known as riparian areas. The health of these areas is critical because riparian-wetland systems purify water. Additionally, many wildlife species depend upon the unique and diverse habitat niches offered by these regions.

These areas are subject to a wide variety of environmental stresses. In some cases, it may be impossible to restore the lands to their previous resiliency and diversity; in others, decades may be required to demonstrate any substantial progress.

The BLM manages more impaired watershed areas than any other bureau of the Department of the Interior. Many of these lands were degraded by the end of the 19th century by environmentally harmful management practices such as unsustainable livestock grazing, timber harvesting, and mining practices. While important strides were made in the 20th century in applying sustainable management practices, resource conditions are still unsatisfactory in some areas. By 2008, the BLM expects that 98 percent of wetlands and 89 percent of riparian areas will achieve desired conditions.

Another area of great concern is the undetected or unmitigated releases of hazardous substances on public lands including areas impacted by landfills, mineral development operations, pipelines, airstrips, and other uses. The BLM is working aggressively to identify and clean up sites that pose dangers to humans or natural resources. Under this plan, approximately 5.6 percent of known contaminated sites will be remediated by 2008.

Improve, Restore, and Maintain the Health of Watersheds and Landscapes: End and Intermediate Outcome Goals

1.1.01: By 2008, 98% of wetland areas (12.5 million acres) will continue to achieve desired conditions as specified in management plans (FY 2004 Baseline: 98%, or 12.5 out of 12.8 million acres).

1.1.02: By 2008, 89% of riparian areas (128,000 miles) will achieve desired conditions as specified in management plans (FY 2004 Baseline: 87%, or 122,400 out of 140,100 miles).

1.1.03: By 2008, 67% of upland areas (143 million acres) will achieve desired conditions as specified in management plans (FY 2004 Baseline: 63%, or 135 out of 214 million acres).

1.1.04/5: In FY 2004, a baseline will be established for the percent of acres of surface waters meeting EPA-approved State water quality standards. By 2008, approximately 123,100 miles (90%) of streams managed by the BLM will meet State (Environmental Protection Agency (EPA) approved) water quality standards (Goal 1.1.05). (FY 2004 Baseline: A baseline will be established for Goal 1.1.04 (surface acres meeting EPA-approved water quality standards) in FY 2004. The FY 2004 baseline for stream miles is 88%, or 120,300 out of 136,800 stream miles).

1.1.06/7: By 2008, 100% of reporting Class I lands (4 units) managed by the BLM will meet ambient air quality standards, and 25% of reporting Class I lands (4 units) will meet visibility objectives (FY 2004 Baseline: ambient air quality standards met in 2 of 4 units (50%), and visibility quality objectives met in 0 of 4 units (0%)).

1.1.08: By 2008, 500 cumulative acres will be reclaimed or mitigated from the effects of degradation from past mining (FY 2004 Baseline: 50 acres; 50 cumulative acres).

1.1.09: By 2008, 20% of acres degraded by wildland fire will have post-fire rehabilitation treatments underway, completed, and monitored (FY 2004 Baseline: 19% underway, completed, and monitored).

1.1.10-12: By 2008, 40,000 acres in fire regimes 1, 2, or 3 will be moved to a better condition class that were identified as high priority through collaboration consistent with the 10-year Implementation Plan; 13% of acres in fire regimes 1, 2, or 3 will be moved to a better condition class; and, 1,300 acres in prior measure will be moved to a better condition class per $1 million of gross investment (FY 2004 Baselines: 31,000 acres, 10% of acres, and 1,300 acres per $1 million).

Improve, Restore, and Maintain the Health of Watersheds and Landscapes: End and Intermediate Outcome Goals (continued)

1.1.13-15: By 2008, 236,000 acres will be treated that are in condition classes 2 or 3 in fire regimes 1 through 3 outside of the wildland urban interface, and will be identified as high priority through collaboration consistent with the 10-Year Implementation Plan; 84% of acres will be treated that are in condition classes 2 or 3 in fire regimes 1 through 3 outside of wildland urban interface; and 8,100 acres will be treated outside the wildland urban interface per $1 million dollars gross investment (Baselines: 225,000 acres, 80% of acres, and 8,100 acres per $1 million).

1.1.16: By 2008, 5.6% (20 of 358 sites) of known contaminated sites will be remediated on BLM-managed land (FY 2004 Baseline: 1.1%, or 4 out of 358 sites).

1.1.17: In 2004, baseline satisfaction scores on resource protection partnerships will be established.

Sustain Biological Communities: End and Intermediate Outcome Goals

1.2.01*: By 2008, there will be a 2% (300,000 acres) decrease from baseline in the number of acres infested with invasive plant species (FY 2004 Baseline: A baseline for this measure will be established in FY 2004).

1.2.02: A baseline for the total number of plant and animal species proposed for listing that have achieved a stable or increasing trend in their resident populations will be established in FY 2004.

1.2.03: By 2008, 2,400 (cumulative) stream/shoreline miles will be restored or enhanced to achieve habitat conditions to support species conservation consistent with management documents and program objectives (FY 2004 Baseline: 585 miles).

1.2.04: By 2008, 40,000 acres will be restored or enhanced to achieve habitat conditions to support species conservation consistent with management documents and program objectives (FY 2004 Baseline: 9,500 acres).

***Note:** Approximately 15 million acres on BLM-administered public lands are infested with weeds. The BLM is averaging treatments on approximately 260,000 acres per year, meaning that 2% of the estimated total lands affected are treated each year. However, this does not account for additional lands that are being newly infested.

Sustain biological communities

BLM-administered public lands are vast and rich in biological diversity. They include approximately 182 million acres of habitat for big game, 213 million acres of small game habitat, and 30 million acres of waterfowl area. Some of the species that inhabit these public lands include approximately 409,000 antelope, 20,500 bighorn sheep, 1,200,000 deer, 234,000 elk, 30,300 moose, and 32,200 wild turkeys.

Many of the BLM-administered lands contain plant and animal species listed under the Endangered Species Act (ESA). These lists have been growing, and this trend is expected to continue due, in large measure, to sprawling developments that fragment wildlife habitats. The BLM works cooperatively with partners and other Federal and State agencies to develop baseline information, establish conservation strategies and treatments, and identify monitoring schedules to support populations under the ESA.

One of the greatest obstacles to achieving ecosystem health on BLM lands is the rapid expansion of invasive plants, which can dominate and cause permanent damage to natural plant communities if not eradicated or controlled. The degradation of public lands by noxious weeds is spreading at an alarming rate, leading to a host of serious problems. Currently, the resources available to combat weed infestations dictate a containment strategy, and actions will continue to be targeted at preventing the spread of weeds into the most vulnerable areas. By 2008, the BLM expects a 2 percent decrease in the number of acres infested with invasive plant species.

In addition to land management, the BLM administers vast aquatic areas, including almost 2.9 million acres of lakes and reservoirs and more than 116,000 miles of fishable streams. These areas contain a wide variety of life, from rare native species such as desert pupfish to endangered species such as steelhead and Chinook salmon. In addition to fisheries management, threatened and endangered species, and clean water initiatives, the BLM has implemented health standards to contribute to the maintenance and restoration of aquatic habitats. During the period of this plan, the BLM expects to restore or enhance 2,400 stream and shoreline miles to support species conservation.

Protect cultural and natural heritage resources

The public lands administered by the BLM contain exceptional geologic formations; wild free-roaming horse and burro herds; wild and scenic rivers; and innumerable paleontological, archaeological, and natural history sites. These resources represent a significant part of our Nation's natural and cultural heritage.

The BLM inventories, evaluates, and, where appropriate, protects these legacies for the use and enjoyment of the American people. We have nearly 2,100 special areas that have been congressionally or administratively designated on BLM-managed public lands. These include Areas of Critical Environmental Concern (ACECs), Wild Horse and Burro Herd Management Areas (HMAs), and Research Natural Areas (RNAs). These areas cover a total of 91.5 million acres, approximately one-third of the 262 million acres under BLM administration.

The BLM also manages the largest, most varied, and scientifically most important body of cultural resources of any Federal land management agency. To date, more than 263,000 archaeological and historic properties have been recorded on public lands, with 4 to 4.5 million estimated to exist. These resources contribute to our understanding of the origins of human history in North America. The BLM's archaeological and historical resources range in age from 13,000-year-old mammoth kill sites associated with the earliest hunters, to more recent historical sites documenting westward migration, mining, ranching, and railroading. More than 200 properties totaling more than 5 million acres are managed for paleontological values or contain paleontological values that may require special management in the future. Significant paleontological resources can also be found on other BLM lands that are estimated to total over 20 million acres.

Development, weathering, and increased use of the public lands for recreational activities are contributing to the decline in the condition of our cultural and paleontological resources. In addition, some sites continue to be targeted by pothunters, looters, and commercial collectors.

Mission Area 2: Resource Use

The public lands under the BLM's jurisdiction provide a myriad of opportunities for commercial activities. Marketable natural resources include energy and mineral commodities, forest products, and grazing forage.

The BLM expends approximately 20 percent of its funding on this mission area, which consists of managing the use of energy resources, non-energy minerals resources, forage resources, and forest and woodland products.

Over the next few years, the BLM will need to address the increasing demand for use authorizations and services from public lands, especially concerning energy and right-of-ways. For our forest resources, we will be using stewardship contracts to build capabilities in local communities for restoring forests and

Protect Cultural and Natural Heritage Resources: End and Intermediate Outcome Goals

1.3.01: By 2008, 81% (44,145 properties out of 54,500) of cultural properties in the BLM's inventory will be in good condition (FY 2004 Baseline: 81%, or 32,900 properties out of 40,500).

1.3.02: By 2008, 100% of collections in the BLM's inventory will be in good condition (FY 2004 Baseline: 100%, or 3 out of 3 collections).

1.3.03: By 2008, 90% of paleontological localities in the BLM's inventory will be in good condition (FY 2004 Baseline: 90%, or 1,660 out of 1,845 localities).

1.3.04: By 2008, 70% (772 out of 1,030 units) of Special Management Areas will meet their heritage resource objectives under authorizing legislation (FY 2004 Baseline: 63%, or 649 out of 1,030 units).

1.3.05: By 2008, 64% (4,170,000 out of 6,515,000 acres) of designated wilderness will achieve wilderness character objectives as specified by statute (FY 2004 Baseline: 60%, or 3,909,000 out of 6,515,000 acres).

1.3.06: By 2008, the percent of miles of designated wild and scenic rivers achieving wild and scenic river condition objectives will increase to 64% (FY 2004 Baseline: 60%, or 1,237 miles out of 2,061 miles).

1.3.07: A baseline will be established in FY 2004 for the percent of miles (4,753 total miles) of designated scenic and historic trails achieving national scenic and historic trail management levels.

1.3.08: By 2008, 100% (29 of 29 units) of the National Monuments and National Conservation Areas will have priority projects initiated to achieve desired resource condition objectives (FY 2004 Baseline: 31%, or 9 out of 29 units).

1.3.09: By 2005, 100% of Herd Management Areas will achieve appropriate management levels (FY 2004 Baseline: 54%, or 111 out of 206 Herd Management Areas).

1.3.10: In 2004, baseline partner satisfaction scores with BLM on cultural and heritage resource partnerships will be determined.

Manage Use of Energy Resources: End and Intermediate Outcome Goals

2.1.01: By 2008, 224 million acres of surface estate and 366 million acres of subsurface estate will continue to be available for energy resource exploration and development consistent with applicable management plans or permitting requirements (FY 2004 Baseline: 2008 target).

2.1.02: By 2008, the average acreage disturbed for each permitted energy exploration or development activity will be reduced to 1.8 acres (FY 2004 Baseline: 2.3 acres).

2.1.03: By 2008, the number of pending cases of permits and lease applications that are in backlog status for fluid energy minerals will be reduced to 1,500 (FY 2004 Baseline: 2,100 fluid energy minerals cases in backlog status).

2.1.04: By 2008, the average full cost of processing applications for permit to drill for fluid energy minerals will be $4,100 (FY 2004 Baseline: $3,950 per permit to drill for fluid energy minerals processed).

2.1.05: By 2008, the number of pending cases of permits and lease applications that are in backlog status for solid energy minerals (leases by application) will be maintained at 26 leases by application (FY 2004 Baseline: 26 leases by application backlog).

2.1.06: By 2008, the number of pending cases of permits and lease applications that are in backlog status for rights-of-way will be reduced to 1,500 rights-of-way (FY 2004 Baseline: 1,850 rights-of-way in backlog status).

2.1.07*: By 2008, the percent of pending cases of permits and lease applications that are processed for fluid energy minerals will increase by 3% to 104% of the applications received (FY 2004 Baseline: 101% of applications received are processed).

2.1.08: By 2008, 18% of the pending cases of permits and lease applications for energy minerals (coal) will be processed (FY 2004 Baseline: 13% of permits/lease applications processed).

2.1.09: By 2008, the number of fluid energy resource compliance inspections and enforcement reviews completed will increase to 96% (FY 2004 Baseline: 95%, or 18,700 inspection and enforcement reviews).

2.1.10: By 2008, the percent of solid minerals inspection, enforcement, and production verification reviews completed, as defined by regulations, will be maintained at 100% (FY 2004 Baseline: 100%).

2.1.11: By 2008, 97% of fluid minerals violations (incidents of non-compliance) will be corrected by operators with the first notice (FY 2004 Baseline: 92% of incidents of non-compliance corrected with first notice).

woodlands, while producing an estimated 7 million board feet of forest products. This stewardship contracting effort should provide job opportunities in local communicates and stimulate the development of markets for the small-diameter wood byproducts and the growing biomass industry.

Manage use of energy resources

From a total of $2.22 billion in annual revenues derived from BLM-administered public lands and mineral resources in FY 2003, energy and minerals generated $2.17 billion, or 98 percent of the total. An estimated $17.8 billion in market sales production resulted in direct and indirect economic impacts totaling $37.3 billion. In recent years, onshore Federal lands have produced about 35 to 40 percent of the Nation's coal, 10 to 11 percent of its natural gas, and 5 percent of its oil. The BLM has approximately 54,000 oil and gas leases, 400 geothermal leases, and 300 coal leases in effect.

While the number of acres available for energy resource exploration and development will remain constant for the foreseeable future (224 million acres of surface and 366 million acres of subsurface estate), the number of leases and acreage under lease are expected to continue to increase at a rate of 3,500 new leases and an additional 3 million acres under lease per year.

In addition to traditional energy sources, the BLM has taken a lead role in developing renewable energy resources on the public lands. These include wind, geothermal, biomass, solar, and hydropower sources. In 2002, the BLM and the Department of Energy's National Renewable Energy Laboratory established a partnership to assess these resources in the western United States and to identify BLM land-use planning units with the highest potential for renewable energy development.

Before the BLM approves a drilling permit or other plan requiring environmental review, an environmental assessment is completed. Significant improvements have been made over the past 5 to 10 years in the reduction of surface-disturbing activities through directional drilling and improved access management. During the period of this plan, the BLM expects a 22 percent decrease in the acreage disturbed for each energy exploration or development activity.

In addition to energy site leases, the BLM processes the right-of-way applications necessary for energy development on public lands. Right-of-way grants are issued to companies to use public lands for roads, pipelines, transmission lines, and communication sites. Because of the increased demand for rights-of-way from energy producers and transporters, the BLM initially anticipates that its backlog will increase; however, over the period of this plan, the BLM expects the backlog will be reduced by nearly 20 percent.

Manage use of non-energy mineral resources

The public lands under the BLM's administration are the source of a number of important mineral resources, including potassium, phosphorus, sodium (trona), potash, lead, and zinc, as well as the sand, gravel, and rock used in construction. During 2002, the production of non-energy leasable minerals from public lands had a market value of $684 million and generated $38 million in revenue for the Federal Government.

The BLM expects that by 2008, a total of 570,700 acres will be available for non-energy mineral resource exploration and development, while a cumulative total of 40,000 acres will be reclaimed to appropriate land condition and water quality standards.

Manage use of forage resources

The BLM, which administers 165 million acres of rangeland in the 12 Western States, including Alaska, plays a significant role in managing the grazing of domestic livestock on public lands. Livestock grazing on these lands is central to the livelihood and culture of many local communities. Among all commodities, forage has the highest indirect effect on dollars circulated through local communities.

The BLM manages rangeland ecosystems on a landscape basis and considers the interrelationships of living organisms, the physical environment, and landscape characteristics. Improving the vegetative habitat and rangeland health of public land ecosystems is beneficial for livestock as well as fish and wildlife habitat.

Under this plan, by 2008, 7.7 percent of upland acres will have range improvements completed that result in sustainable grazing. The BLM's successes thus far in increasing the percent of rangelands attaining appropriate land conditions can be partially attributed to our collaborative relationships with other stakeholders, including the Society for Range Management, State land grant colleges, the Natural Resources Conservation Service, and the U. S. Forest Service. In addition, we encourage private parties and other beneficiaries to contribute funds toward upgrading rangelands and to agree to shifting project maintenance responsibilities to the benefiting user.

Manage Use of Energy Resources: End and Intermediate Outcome Goals (continued)

2.1.12: By 2008, the customer satisfaction rating with the energy resources permitting process will increase by 5% to a 55% approval rating (FY 2004 Baseline: 50% customer satisfaction rating).

***Note:** During the period of this plan, the percent of pending cases of permits and lease applications processed for energy minerals is anticipated to increase by 3%. "Pending cases" include processing both current year and backlogged permits and applications, subsequent well operations, and other lease operations that result in additional surface disturbance requiring approval.

Manage Use of Non-energy Mineral Resources: End and Intermediate Outcome Goals

2.2.01: By 2008, 570,700 acres will continue to be available for non-energy mineral resource exploration and development consistent with applicable management plans (FY 2004 Baseline: 2008 target).

2.2.02: By 2008, 40,000 acres (cumulative total), or approximately 8,000 acres per year, will be reclaimed to appropriate land condition and water quality standards (FY 2004 Baseline: 8,000 acres).

2.2.03*: By 2008, the average time for review and approval of saleable, leasable, and locatable minerals processing actions will be maintained at 18 months (FY 2004 Baseline: 2008 target).

2.2.04: In FY 2004, the baseline for the percent of pending cases of permits and lease applications that are processed for non-energy minerals will be established.

2.2.05: By 2008, the percent of non-compliance and trespass actions that are resolved for non-energy minerals will increase by 1.5% to 25.5% (FY 2004 Baseline: 24% of non-compliance and trespass actions for non-energy minerals will be resolved).

2.2.06: By 2008, the customer satisfaction rating with the non-energy mineral permitting process will increase by approximately 5% to 82.5% (Baseline 77.4% satisfaction with the non-energy permitting process).

***Note:** The average time for review and approval of saleable, leasable, and locatable minerals processing actions is projected to remain constant over the duration of this plan.

Manage Use of Forage Resources: End and Intermediate Outcome Goals

2.3.01: By 2008, 7.7% of upland acres will have range improvements completed that result in sustainable grazing (FY 2004 Baseline: 6.8%).

2.3.02: By 2008, 67% of permitted acres will be maintained at appropriate land conditions and will meet water and air standards (FY 2004 Baseline: 63%).

2.3.03: By 2008, the average time (number of days) for processing and issuing grazing permits will be reduced to 200 days (FY 2004 Baseline: 215 days).

Manage Use of Forest and Woodland Products: End and Intermediate Outcome Goals

2.4.01/02: By 2008, 125% of the established strategic goal (ESG) for public domain (PD) lands and 149% of Allowable Sale Quantity (ASQ) for O&C lands will be offered, consistent with management plans (FY 2004 Baseline: Established strategic goal is 106% for PD lands, while Allowable Sale Quantity is 79% for O&C lands).

2.4.03/04: By 2008, 343 million board feet (MMBF) of timber will be offered for sale (40 MMBF from PD lands and 303 MMBF from O&C lands (of which 203 is from ASQ lands and 100 from LSR lands)) (FY 2004 Baseline: 184.0 MMBF: 34 MMBF from PD lands and 150 MMBF from O&C lands).

2.4.05*: By 2008, 100% of permitted acres will be maintained at appropriate land conditions and water quality standards (FY 2004 Baseline: 100%).

2.4.06: By 2008, the administrative cost per million board feet of timber offered for sale will be $165,000. (FY 2004 Baseline: $165,000 per million board feet – O&C only). The target for the PD lands will be established in FY 2004 and will be added to the O&C costs).

***Note:** The measure for percent of permitted acres maintained at appropriate land conditions and water quality standards will always be 100%, as the BLM will not permit use unless appropriate land and water quality standards are maintained.

Manage use of forest and woodland products

Ranging from the black-and-white spruce forest in Alaska to the Douglas-fir and mixed-conifer forests of Oregon and California and the pinyon pine and juniper woodlands in the Southwest, the BLM manages 55 million acres of forest and woodland.

These areas are managed under the principles of multiple use, sustained yield, and protection of environmental quality. Decisions about land use for recreation, aesthetics, water quality, and wildlife habitat, as well as timber and other forest biomass production, are made with an emphasis toward sustaining biological diversity and the long-term health of the land. In addition, the forest lands in western Oregon are managed under the Northwest Forest Plan, which emphasizes the restoration of wildlife and fisheries habitat, as well as a scientifically sound, environmentally responsible, and sustainable level of timber sales. This includes thinning of young stands in Late-Successional Reserves (LSRs) to accelerate the attainment of late-successional and old-growth characteristics.

Healthy Forests: An Initiative for Wildfire Prevention and Stronger Communities was announced in August 2002 in response to a proliferation of catastrophic fires and environmental degradation that threatens the American people, their property, and our environment, particularly the forest and rangelands of the West. This initiative focuses on reducing the risk of catastrophic fire by thinning dense tree undergrowth and brush in priority locations that are selected through a collaborative process with Federal, State, tribal, and local officials and communities. In December 2003, the Healthy Forest Restoration Act was signed into law, in continued support of the Healthy Forest Initiative and in recognition of the forest health problems throughout the Nation.

At present, approximately 16 million acres of public land are in need of ecological restoration work, including mechanical thinning and tree species reintroduction.

Mission Area 3: Recreation

Recreation and leisure activities are a major part of the lifestyles of millions of Americans, as well as international visitors. The BLM-administered public lands and waters offer a vast array of recreational opportunities, from hunting and camping to tours of natural and cultural heritage sites.

In 2003, there were 52.9 million visits and 66.7 million visitor days of recreational use on BLM public lands. Even under conservative projections, visits could increase by three percent each year, resulting in use levels of 61.3 million visits and 77.3 million visitor days by 2008. More accessible areas may experience a 10 percent or more increase in visitation each year.

The BLM expends about 4 percent of its funding to contribute toward the Department of the Interior's goals for this mission area, which is divided into two sections: enhancing the quality of recreational opportunities and improving access, and providing value and promoting quality services for recreation. The BLM's long-term goal in this area is to provide better access to high-quality recreation opportunities at a cost that is fair to visitors and taxpayers.

Over the next few years, the BLM's efforts will focus beyond activity-based projects toward managing recreation for desired experiences and other quality of life benefits, maintaining the character of dependent recreation settings, and then balancing all management actions to achieve these ends. Having this more comprehensive approach will improve visitors' satisfaction with the quality of their experience.

Enhance the quality of recreational opportunities and improve access

Federal agencies are required by law to make their facilities and programs accessible to people with disabilities. The BLM performs accessibility evaluations of its recreation facilities to identify barriers and develop solutions. Barrier removal and facility retrofit recommendations are then incorporated into deferred maintenance projects or developed as stand-alone, universal access initiatives.

The Bureau is concerned with finding opportunities to reach out to its visitors and provide effective interpretation and educational programs. To meet these challenges, the BLM has increased the number of wayside exhibits on public lands that tell the story of how the BLM manages resources and gives visitors the information they need to be more environmentally responsible while enjoying public lands.

Among these programs are "Leave No Trace," an outdoor ethics program focused on minimizing impacts on natural resources and wildlife, and "Tread Lightly!," which empowers outdoor enthusiasts to recreate responsibly. The Bureau also participates in National Public Lands Day projects, which draw thousands of volunteers to our sites and promote environmental awareness and ethical outdoor behavior.

Provide value in recreation and promote quality services

Each year, the BLM averages approximately 2,150 commercial and group and 27,000 non-commercial recreation permits processed, 485,000 recreation use (entrance and daily use) permits issued and managed, and 2,450 commercial and group special recreation permits inspected for compliance. The BLM provides for and receives fair value and return from recreation

Enhance the Quality of Recreational Opportunities and Improve Access: End and Intermediate Outcome Goals

3.1.01: By 2008, the satisfaction with meeting the public's demand for recreation, as measured by a general public survey, will be improved by 10% to 40% (FY 2004 Baseline: 30% satisfaction rating for meeting public demand).

3.1.02: By 2008, visitor satisfaction with the quality of their recreation experience will be improved to 95% (FY 2004 Baseline: 94%).

3.1.03: By 2008, 260 million acres will continue to be available for recreation through management actions and partnerships (FY 2004 Baseline: 260 million acres).

3.1.04: By 2008, 14,500 miles of river and shoreline will continue to be available for recreation through management actions and partnerships (FY 2004 Baseline: 14,500 miles of river and shoreline available for recreation).

3.1.05: By 2008, the total number of recreation facilities that are universally accessible will increase by 3% to a total of 12% (FY 2004 Baseline: 9% of recreation facilities are universally accessible).

3.1.06: By 2008, 3,000 online recreation transactions will be supported by the BLM (FY 2004 Baseline: 2,500 transactions).

3.1.07: By 2008, 84% of recreation areas (3,271 out of 3,894) will have established and maintained community partnerships (FY 2004 Baseline: 80%, or 3,115 out of 3,894 recreation areas).

3.1.08: By 2008, 10,700 individuals will be using an interagency pass (FY 2004 Baseline: 10,700).

3.1.09: By 2008, 84% of recreation facilities will be in fair to good condition as measured by the Facilities Condition Index (FY 2004 Baseline: 82%).

3.1.10: By 2008, 85,000 visitors will be served by facilitated programs (FY 2004 Baseline: 82,700 visitors).

3.1.11: By 2008, 92% of visitors will be satisfied with the quality of interpretation and environmental education products in Special Recreation Management Areas as measured by a general public survey (FY 2004 Baseline: 72%).

Provide Value in Recreation and Promote Quality Services: End and Intermediate Outcome Goals

3.2.01: By 2008, 85% of customers will continue to be satisfied with value for fee paid (FY 2004 Baseline: 85% satisfaction rating).

Provide Value in Recreation and Promote Quality Services: End and Intermediate Outcome Goals (continued)

3.2.02*: By 2008, 0% of concession activities will have performance-based contracts (FY 2004 Baseline: 0%, or 0 out of 19 concessions).

3.2.03: In FY 2004, a baseline for the cost per visitor at developed and recreational fee demonstration sites will be determined.

***Note:** The BLM reports a baseline of 0% for concessions with performance-based contracts. Since most of the existing contracts are for a 30-year period, progress will be slow in making changes in this area.

Improve Fire Management and Safety: End and Intermediate Outcome Goals

4.1.01: Annually report loss of life from severe, unplanned, and unwanted wildland fires (FY 2004 Baseline: report actual lives lost; targets not set).

4.1.02: Annually report firefighter injuries from severe, unplanned and unwanted, wildland fires (FY 2004 Baseline: report actual numbers; targets not set).

4.1.03: Annually report damage to communities and the environment from severe, unplanned, and unwanted wildland fires (FY 2004 Baseline: report actual dollar loss; targets not set).

4.1.04: Annually report amount of time lost from firefighter injury in proportion to the number of days worked across all agencies (FY 2004 Baseline: report actual days; targets not set).

4.1.05: Annually report number of homes and significant structures lost as a result of wildland fires (FY 2004 Baseline: report actual days; targets not set).

4.1.06: Annually report visitor lives lost due to illegal activities on Department of the Interior lands and facilities (incidents per 100,000 visitor/resident days) (FY 2004 Baseline: report actual incidents; targets not set).

4.1.07: Annually report serious injuries to visitors due to illegal activities on Department of the Interior lands and facilities (FY 2004 Baseline: report actual serious injuries; targets not set).

4.1.08: By 2008, control 95% of unplanned and unwanted wildland fires during initial attack (FY 2004 Baseline: 95%).

4.1.09: Annually report number of acres burned by unplanned and unwanted wildland fires (FY 2004 Baseline: report actual acres; targets not set).

4.1.10/11: By 2008, treat 40% (105,000 acres out of 262,500 acres) in the wildland-urban interface that are identified as high priority through collaboration consistent with the 10-Year Implementation Plan (FY 2004 Baseline: 40% of all acres treated (105,000 acres) in the wildland-urban interface).

through leasing commercial services and other use authorization permits, and developing collaborative partnerships with business, industry, and local governments within gateway communities. These community-based partnerships expand the scope of permit and fee management to jointly manage permits with recreation-tourism businesses and local governments.

Total recreation receipts from permit revenues amounted to $8.6 million in 2001 and $9.2 million in 2002, with projected receipts for 2003 estimated at $9.5 million. The BLM continues to participate in the Recreational Fee Demonstration Program, in which visitors are charged a fee to use many of the Bureau's campgrounds and other developed recreation sites. All of the money collected is reinvested at the site of collection to improve physical infrastructure and enhance customer satisfaction, directly benefiting those who pay for and use the site.

Mission Area 4: Serving Communities

The BLM expends approximately 53 percent of its funding to serve the Nation's citizens and communities, ensure that people and property are protected from hazards associated with the BLM's land management programs, and fulfill the government's Indian trust responsibilities. To achieve these goals, the BLM collaborates with many constituents, applying the Secretary of the Interior's Four C's Vision: "Conservation through Cooperation, Consultation, and Communication."

The BLM's goals under this mission can be divided into three main areas: improve fire management and safety; improve public safety and security and protect public resources; and improve information management.

Improve fire management and safety

The BLM provides fire protection for 388 million acres of public and State lands. Recent seasons have demonstrated that adequate firefighting resources and a high level of preparedness can control fires and prevent extensive destruction. The measure for the percent of unplanned and unwanted wildland fires controlled during initial attack has remained relatively constant at 95 percent.

An overabundance of fuel still exists in some areas, however, and will for years to come. Consequently, severe fire outbreaks, widespread damage to public lands and resources, and even loss of human life can be anticipated. In addition, continued population growth in rural areas of the West has increased risks from fire and natural emergencies. The BLM continues to work to reduce these hazards through field inspections, periodic maintenance, and the repair of its buildings and recreation sites. While the BLM is taking steps to reduce the number of human-caused fires, blazes caused by natural events such as lightning will always present a risk.

Our strategies to fight these ongoing threats include using prescribed fire to protect communities at risk. The BLM's fire and aviation program works cooperatively with its Federal and State partners to suppress and manage wildland fire. In addition, the wildland fire management program is actively integrating fire management into the maintenance and restoration of ecosystems.

Improve public safety and security and protect public resources

Public lands are not immune from criminal activities that threaten resources and the health and safety of visitors. With the growth of communities in areas that are adjacent to public lands, illegal activities and unauthorized uses will continue to flourish.

These activities include vandalism and theft of irreplaceable natural and cultural resources, illegal drug cultivation and drug labs, and hazardous waste dumping. In addition, since the terrorist attacks of September 11, 2001, the BLM's law enforcement program has responded to numerous homeland-security-related requests from the Department of the Interior and other Federal agencies.

To ensure that visitors have safe and positive experiences, BLM rangers and special agents maintain a capability for providing public assistance and responding to illegal activities. The BLM uses administrative, civil, and criminal enforcement remedies to hold violators responsible and to recover compensation.

The BLM also engages in hazardous material response actions, site evaluations, and prioritization of cleanups. The BLM works with the Environmental Protection Agency, local environmental departments, and potentially responsible parties to fund and expedite the cleanup of hazardous sites. We prioritize sites that are an imminent threat to public health and safety, as well as those sites that can generate penalties and fines.

Improve information management

The BLM has extensive historical records and maintains current land title information on ownership, condition, location, rights, and authorized uses. The BLM also performs cadastral surveys and completes land transactions, producing voluminous amounts of information that support land management and scientific activities for many government agencies, as well as the private sector. The BLM 's records provide a critical foundation for addressing energy development, urban growth, and wildland fire management.

Improve Fire Management and Safety: End and Intermediate Outcome Goals (continued)

4.1.12: By 2008, continue to treat 3,020 acres in the wildland-urban interface (WUI) per $1 million gross investment. (FY 2004 Baseline: 3,020 acres treated in WUI per $1 million gross investment).

Improve Public Safety and Security and Protect Public Resources: End and Intermediate Outcome Goals

4.1.13: By 2008, 10% of physical and chemical hazards will be mitigated within 120 days to ensure public safety (FY 2004 Baseline: 10% of an annual estimated total of 589 physical and chemical hazards).

4.1.14: By 2008, 82% of BLM organizational units (98 out of 120 facilities) will be rated in good safety, health, and environmental condition (FY 2004 Baseline: 68%, or 78 out of 114 facilities).

4.1.15*: By 2008, 90% (4,170 out of 4,634) of buildings (e.g., administrative sites and employee housing) will be maintained in fair to good condition as measured by the Facility Asset Management System (FY 2004 Baseline: 90%, or 4,170 out of 4,634 buildings).

4.1.16*: By 2008, 68% of roads (50,740 out of 78,060), 70% of dams (446 out of 495), 97% of bridges (861 out of 888), and 70% of trails will be in fair to good condition.

***Note:** The BLM currently does not have the capability to place Facility Condition Index ratings on its facilities; however, the interim plans will report on the percent of facilities in fair or good condition.

Improve Information Management: End and Intermediate Outcome Goals

4.1.17: In FY 2006, the baseline will be established for the percent of townships for which BLM has data responsibility (excluding Indian Trust lands) that will be accessible on the Internet through the National Integrated Lands System website.

4.1.18: In FY 2005, the baseline will be established for the percent of cadastral surveys approved within 18 months of the funding date.

4.1.19: In FY 2005, the baseline will be established for the percent of Federal and Indian lands that will have modern brass cap surveys (acres with brass cap surveys/all Federal lands).

4.1.20: By 2008, 88.2% of the total available acreage will be transferred from BLM administration to the State of Alaska and the Alaska Native Corporations (FY 2004 Baseline: 86.3% of the total available acreage will be transferred from BLM administration to the State of Alaska and the Alaska Native Corporations).

Improve Information Management: End and Intermediate Outcome Goals (continued)

4.1.21: In FY 2008, 200,000 public land title records will be posted on the Internet to assist in title, survey, historical, and genealogical research (FY 2004 Baseline: In FY 2004, an additional 200,000 public land title records will be posted on the Internet).

4.1.22: In FY 2004, the baseline will be established for the percent of areas under BLM administration that are covered by current resource management plans based on land-use plan evaluations.

4.1.23: By FY 2008, 120,000 acres of land disposals and conveyances will be completed outside of Alaska (FY 2004 Baseline: 100,000 acres of land disposals and conveyances will be completed outside of Alaska).

4.1.24: In FY 2004, the baseline will be established for the number and acreage of land exchanges and acquisitions to improve land tenure distribution.

The national Geographic Coordinate Data Base website has proven to be successful and is providing the most accurate digital portrayal of parcel boundaries. The BLM also has lead responsibility for the National Integrated Lands System, a collaborative project with the U.S. Forest Service, States, counties, tribes, and other Federal agencies to provide a business solution for land managers. But even with these systems in place during the past two decades, demands on public land resources have grown at a rate that outpaces our ability to resolve existing land-use conflicts and to anticipate future demands accurately. In addition, several major issues have emerged since the first round of land-use plans and their associated environmental impact statements were completed, including the protection of species habitat under the Endangered Species Act, rapid population growth in the West, and a renewed emphasis on the need to develop domestic energy sources. As a result of these factors, the BLM has found that many of its land-use plans are out of date and no longer reflect natural resource or socioeconomic conditions.

The focus of the BLM's current efforts is ensuring the adequacy of its existing land-use planning and National Environmental Policy Act (NEPA) base with respect to new information about demands on public land resources. National Environmental Policy Act and land-use planning documents must be updated to reduce the risks of litigation and ensure that the BLM has a greater degree of success in meeting its program goals.

Establishing clear priorities is the key to managing increasing workload demands and is vital to the overall success of the BLM's planning initiative. Accordingly, the BLM identifies high-priority land-use planning efforts as time-sensitive when they relate to the development of energy resources, respond to nationally significant lawsuits, or have legislatively mandated time frames. Under this plan, by 2008, it is estimated an additional 20 percent of areas under BLM administration will be covered by current resource management plans based on land-use plan evaluations.

Appendices

Implementing GPRA

The Government Performance and Results Act (GPRA) requires Federal agencies to set priorities and goals, determine strategies for reaching those goals, measure their performance, and report on progress each year. In 1997, the Bureau of Land Management (BLM) developed and published its first strategic plan for the period 1997–2002. In 2000, the BLM revised its strategic plan for the period 2001–2005 by simplifying its structure and refining its goals. Now, in 2004, the BLM's operating plan tiers off of the Department of the Interior's strategic plan, released in September 2003.

This operating plan establishes long-term direction for the BLM and focuses on the goals, strategies, and measures needed to assess our performance and identify our contribution to the goals and measures of the Department's strategic plan. The long-term targets established in this operating plan are based on the assumption that BLM funding will remain constant or slightly decline over the period of this plan.

Management Excellence

The Administration has challenged agencies throughout government to improve service to the public. The President's Management Agenda (PMA) is a "package" of reform initiatives based on the principles that government should be "citizen-centered, results-oriented, and market-based." The underlying objective of these reform initiatives is to improve our performance—to achieve measurable and better results with our resources, at a good value for the American people. The BLM's progress on implementing the reform initiatives outlined in the PMA is monitored using a self-assessment scorecard system. This system employs a red, yellow, and green grading scheme (like a traffic light) for gauging our efforts on each of these five agenda items:

- Strategic Management of Human Capital
- Improved Financial Performance
- Expanded Electronic Government
- Budget and Performance Integration
- Competitive Sourcing

Management excellence is imperative if the BLM is to be able to successfully meet its long-term goals and targets as identified in this operating plan. Bureau of Land Management personnel will need to reconcile the public's increasing demand for services and products with constrained budget resources. In recent years, the BLM has undertaken many of its own service improvement initiatives, including Service First, cost and performance management, and performance-based service contracting. As a result of these efforts, the BLM is in a better position to carry out the PMA initiatives in ways that can enhance the Bureau's effectiveness.

Verifying Performance Data

Reliable data is necessary for the successful implementation of this operating plan. The BLM will continue to address data reliability issues through internal reporting and tracking systems, including the continued application of the data validation and verification matrix developed by the Department of the Interior. The BLM completes self-assessments, Program Assessment Rating Tool evaluations, and program or general management evaluations that assess data validity and include verification of reported accomplishments.

BLM OPERATING PLAN TABLE FY 2004 - 2008

	Measure Name	FY 2004 Target	FY 2005 Target	FY 2006 Target	FY 2007 Target	FY 2008 Target
1	Mission Area: Resource Protection					
1.1	End Outcome Goal - Improve health of watersheds, landscapes, and marine resources that are DOI managed or influenced in a manner consistent with obligations regarding the allocation and use of water.					
1.1.01	End Outcome Measure: Wetland areas - Cumulative percent of acres achieving desired conditions where specified in management plans and condition is known, consistent with applicable substantive and procedural requirements of State and Federal water law. (SP)[1]	98%	98%	98%	98%	98%
1.1.02	End Outcome Measure: Riparian Areas - Cumulative percent of riparian miles (stream miles) achieving desired conditions where specified in management plans and condition is known, consistent with applicable substantive and procedural requirements of State and Federal water law. (SP)	87.0%	87.5%	88.0%	88.5%	89.0%
1.1.03	End Outcome Measure: Upland Areas – Cumulative percent of acres achieving desired conditions where specified in management plans and condition is known, consistent with applicable substantive and procedural requirements of State and Federal water law. (SP)	63%	64%	65%	66%	67%
1.1.04	End Outcome Measure: Surface Waters -- Cumulative percent of surface waters (acres) managed by DOI that meet EPA Approved (State) Water Quality Standards. (SP)	Establish Baseline	TBD	TBD	TBD	TBD
1.1.05	End Outcome Measure: Surface Waters -- Cumulative percent of surface waters (stream miles) managed by DOI that meet EPA Approved (State) Water Quality Standards. (SP)	88%	88%	88%	89%	90%
1.1.06	End Outcome Measure: Cumulative percent of reporting Class I DOI lands that meet National Ambient Air Quality Standards (NAAQS). (SP)	50%	50%	50%	50%	100%
1.1.07	End Outcome Measure: Cumulative percent of reporting Class I DOI lands that meet visibility objectives. (SP)	0%	0%	0%	0%	25%
1.1.08	End Outcome Measure: Cumulative number of land acres reclaimed or mitigated from the effects of degradation from past mining. (SP)	50 acres	100 acres (cum. = 150 acres)	100 acres (cum. = 250 acres)	100 acres (cum. = 350 acres)	150 acres (cum. = 500 acres)
Intermediate Strategy - Restore and maintain proper function to watersheds and landscapes						
1.1.09	Intermediate Outcome Measure: Restore Fire Adapted Ecosystems/Fire Rehabilitation: Cumulative percent of acres degraded by wildland fire with post-fire rehabilitation treatments underway, completed, and monitored. (SP)	19%	20%	20%	20%	20%
1.1.10	Intermediate Outcome Measure: Restore Fire Adapted Ecosystems/Condition Class: Number of total acres in fire regimes 1, 2, or 3 that were identified as high priority through collaboration consistent with the 10-year Implementation Plan moved to a better condition class – in total. (SP)	31,000 acres	33,500 acres	36,000 acres	38,000 acres	40,000 acres
1.1.11	Intermediate Outcome Measure: Restore Fire Adapted Ecosystems/Condition Class: Number of total acres in fire regimes 1, 2, or 3 that were identified as high priority through collaboration consistent with the 10-year Implementation Plan moved to a better condition class-as a percent of total acres. (SP)	10.0%	10.8%	11.6%	12.3%	13.0%
1.1.12	Intermediate Outcome Measure: Restore Fire Adapted Ecosystems/Condition Class: Number of acres in prior measure (Performance Measure 1.1.10) moved to a better condition class per million dollars of gross investment. (SP)	1,300 acres	1,300 acres	1,300 acres	1,300 acres	1,300 acres
1.1.13	Intermediate Outcome Measure: Reduce Hazardous Fuels: Number of total acres treated that are in condition classes 2 or 3 in fire regimes 1 through 3 outside of wildland-urban interface, and are identified as high priority through collaboration consistent with the 10-Yr. Implementation Plan – in total. (SP)	225,000 acres	228,000 acres	231,000 acres	233,000 acres	236,000 acres
1.1.14	Intermediate Outcome Measure: Reduce Hazardous Fuels: Number of acres treated that are in condition classes 2 or 3 in fire regimes 1-3 outside of WUI, and are identified as high priority through collaboration consistent with the 10-Yr. Implementation Plan -- as a percent of all acres treated. (SP)	80%	81%	82%	83%	84%
1.1.15	Intermediate Outcome Measure: Reduce Hazardous Fuels: Number of acres treated outside the wildland-urban interface per million dollars gross investment. (SP)	8,100 acres	8,100 acres	8,100 acres	8,100 acres	8,100 acres
1.1.16	Intermediate Outcome Measure: Land Contamination: Percent of known contaminated sites remediated on DOI managed land. (SP)	1.1%	2.3%	3.4%	4.5%	5.6%
Intermediate Strategy - Improve information base, information management, and technical assistance.						
1.1.17	Intermediate Outcome Measure: Forge Effective Partnerships: Satisfaction scores on resource protection partnerships. (SP)	Establish Baseline	TBD	TBD	TBD	TBD

BLM OPERATING PLAN TABLE FY 2004 - 2008

	Measure Name	FY 2004 Target	FY 2005 Target	FY 2006 Target	FY 2007 Target	FY 2008 Target
1.2	End Outcome Goal: Sustain desired biological communities on DOI managed and influenced lands and waters in a manner consistent with obligations regarding the allocation and use of water.					
1.2.01	End Outcome Measure: Invasive Plant Species: Percent change from baseline in the number of acres infested with invasive plant species. (SP)	Establish Baseline	Initial Target-0.5%	-1.0%	-1.5%	-2.0%
1.2.02	End Outcome Measure: Threatened & Endangered Species -- Percent of the plant/animal species listed or proposed for ESA listing achieving a stable or increasing trend in their resident populations. (BUR)[2]	Establish Baseline	TBD	TBD	TBD	TBD
Intermediate Strategy - Create habitat conditions for biological communities to flourish.						
1.2.03	Intermediate Outcome Measure: Habitat Restoration: Number of stream/shoreline miles restored or enhanced to achieve habitat conditions to support species conservation consistent with management documents, program objectives. (SP)	585 miles	500 miles (cum. = 1,085 miles)	500 miles (cum. = 1,585 miles)	500 miles (cum. = 2,085 miles)	315 miles (cum. = 2,400 miles)
1.2.04	Intermediate Outcome Measure: Habitat Restoration: Number of acres restored or enhanced to achieve habitat conditions to support species conservation consistent with management documents, program objectives. (SP)	9,500 acres	19,000 acres	29,000 acres	29,000 acres	40,000 acres
1.3	End Outcome Goal - Protect cultural and natural heritage resources.					
1.3.01	End Outcome Measure: Cultural Resource Properties: Cumulative percent of cultural properties on DOI inventory in good condition. (SP)	81%	81%	81%	81%	81%
1.3.02	End Outcome Measure: Cultural Resource Collections: Cumulative percent of collections in DOI inventory in good condition. (SP)	100%	100%	100%	100%	100%
1.3.03	End Outcome Measure: Paleontology Localities: Percent of paleontology localities in DOI inventory in good to fair condition. (SP)	90%	90%	90%	90%	90%
1.3.04	End Outcome Measure: Natural Heritage Resources: Percent of Special Management Areas meeting their heritage resource objectives under the authorizing legislation. (SP)	63.0%	64.5%	66.0%	67.5%	70.0%
Intermediate Strategy - Manage special management areas for natural heritage resource objectives.						
1.3.05	Intermediate Outcome Measure: Wilderness Areas: Percent of acres of designated wilderness achieving wilderness character objectives as specified by statute. (SP)	60%	61%	62%	63%	64%
1.3.06	Intermediate Outcome Measure: Wild and Scenic Rivers: Cumulative percent of miles of designated wild and scenic rivers achieving wild and scenic river condition objectives. (DOI non-key)[3]	60%	61%	62%	63%	64%
1.3.07	Intermediate Outcome Measure: Scenic and Historic Trails: Cumulative percent of miles of designated scenic and historic trails achieving national scenic and historic trial management levels. (DOI non-key)	Establish Baseline	TBD	TBD	TBD	TBD
1.3.08	Intermediate Outcome Measure: Cumulative National Monuments and National Conservation Areas: Initiate priority projects to achieve the resource condition objectives for x percent of the NMs and NCAs. (BUR)	31%	45%	59%	75%	100%
1.3.09	Intermediate Outcome Measure: Wild Horse and Burro Management Areas: Cumulative percent of number of Herd Management Areas achieving appropriate management levels. (BUR)	54%	77%	85%	93%	100%
Intermediate Strategy: Increase partnerships, volunteer opportunities, and stakeholder satisfaction.						
1.3.10	Intermediate Outcome Measure: Partnerships: Partner satisfaction scores with DOI on cultural and heritage resource partnerships. (SP)	Establish Baseline	TBD	TBD	TBD	TBD
2	Mission Area: Resource Use					
2.1	End Outcome Goal - Manage or influence resource use to enhance public benefit, promote responsible use, and ensure optimal value: Energy					
2.1.01	End Outcome Measure: Provide for Access: Cumulative number of onshore acres available for energy resource exploration and development consistent with applicable management plans or permitting requirements. (SP)	590M acres: 224M surface, 366M sub-surface	590M acres: 224M surface, 366M sub-surface	590M acres: 224M surface, 366M sub-surface	590M acres: 224M surface, 366M sub-surface	590M acres: 224M surface, 366M sub-surface
2.1.02	End Outcome Measure: Responsible Use: Average acreage disturbed per permitted energy exploration or development activity. (SP)	2.3 acres	2.1 acres	2.1 acres	2.0 acres	1.8 acres
Intermediate Strategy - Effectively manage and provide for efficient access and development.						
2.1.03	Intermediate Outcome Measure: Processing Backlog/Fluid Minerals: Number of pending cases of permits that are in backlog status for fluid energy minerals (APDs) (SP)	2,100 APDs	1,900 APDs	1,700 APDs	1,600 APDs	1,500 APDs

BLM OPERATING PLAN TABLE FY 2004 - 2008

	Measure Name	FY 2004 Target	FY 2005 Target	FY 2006 Target	FY 2007 Target	FY 2008 Target
2.1.04	Intermediate Outcome Measure: Cost Efficiency: The average full cost of processing applications for (fluid energy) Permit to Drill Applications (APDs). (PART)[4]	$3,950 / APD Processed	$3,950 / APD Processed	$4,100 / APD Processed	$4,100 / APD Processed	$4,100 / APD Processed
2.1.05	Intermediate Outcome Measure: Processing Backlog/Solid Minerals: Number of pending cases of lease applications that are in backlog status for solid energy minerals (LBAs). (SP)	26 LBAs	26 LBAs	26 LBAs	26 LBAs	26 LBAs
2.1.06	Intermediate Outcome Measure: Processing Backlog/Rights-of-Way: Number of pending cases of permits and lease applications that are in backlog status for rights-of-way (R/Ws). (SP)	1,850 ROWs	1,750 ROWs	1,600 ROWs	1,550 ROWs	1,500 ROWs
2.1.07	Intermediate Outcome Measure: Processing/Percent Processed -- Increase the percent of pending cases of permits and lease applications that are processed for fluid energy minerals (APDs). (PART)	101%	102%	103%	103.5%	104%
2.1.08	Intermediate Outcome Measure: Processing/Percent Processed -- Increase the percent of pending cases of permits and lease applications that are processed for energy minerals (coal). (PART)	13%	47%	20%	16%	18%
Intermediate Strategy - Enhance responsible use management practices						
2.1.09	Intermediate Outcome Measure: Compliance/Percent of Strategy: Increase the percent of fluid energy resource compliance inspections and enforcement reviews completed. (PART)	95.0%	95.5%	95.5%	96.0%	96.0%
2.1.10	Intermediate Outcome Measure: Compliance/Percent of Strategy: The percent of solid minerals inspection and enforcement reviews completed. (PART)	100%	100%	100%	100%	100%
2.1.11	Intermediate Outcome Measure: Compliance/Percent of INCs Corrected - Percent of Fluid Minerals Violations (Incidents of Non-Compliance or INCs) corrected by operators with first notice. (PART)	92%	94%	95%	96%	97%
Intermediate Strategy - Improve information base, information management, and technical assistance						
2.1.12	Intermediate Outcome Measure: Satisfaction Rating: Improve customer satisfaction rating with energy resources permitting process. (PART)	50%	51%	53%	54%	55%
2.2	End Outcome Goal: Manage or Influence Resource Use to Enhance Public Benefit, Promote Responsible Use, and Ensure Optimal Value - Non-Energy Minerals.					
2.2.01	End Outcome Measure: Access: Cumulative Number of acres available for non-energy mineral resource exploration and development consistent with applicable management plans. (SP)	570,700 acres	570,700 acres	570,700 acres	570,700 acres	570,700 acres
2.2.02	End Outcome Measure: Responsible Use: Number of acres reclaimed to appropriate land condition and water quality standards. (SP)	8,000	8,000 acres (cum. = 16,000)	8,000 acres (cum. = 24,000)	8,000 acres (cum. = 32,000)	8,000 acres (cum. = 40,000)
Intermediate Strategy - Effectively manage and provide for efficient access and production						
2.2.03	Intermediate Outcome Measure: Permit Processing: Average time for review and approval of saleable, leasable, and locatable minerals processing actions. (SP)	18 months	18 months	18 months	18 months	18 months
2.2.04	Intermediate Outcome Measure: Processing/Percent: Increase the percent of pending cases of permits and lease applications that are processed for non-energy minerals. (BUR)	Establish Baseline	TBD	TBD	TBD	TBD
Intermediate Strategy - Enhance responsible use management practices						
2.2.05	Intermediate Outcome Measure: Compliance: Increase the percent of non-compliance and trespass actions that are resolved for non-energy minerals. (BUR)	24%	24.5%	25%	25%	25.5%
Intermediate Strategy - Improve information base, information management, and technical assistance						
2.2.06	Intermediate Outcome Measure: Satisfaction Rating: Improve customer satisfaction rating with the non-energy mineral permitting process. (BUR)	77.4%	78.5%	80.0%	81.0%	82.5%
2.3	End Outcome Goal -- Manage or influence resource use to enhance public benefit, promote responsible use, and ensure optimal value: Forage					
2.3.01	End Outcome Measure: Restoration: Percent of acres with DOI range improvements resulting in sustainable grazing. (SP)	6.8%	7.0%	7.3%	7.5%	7.7%
2.3.02	End Outcome Measure: Percent of permitted acres maintained at appropriate land conditions and water and air standards. (SP)	63%	64%	65%	66%	67%
Intermediate Strategy -- Provide access for grazing.						
2.3.03	Intermediate Outcome Measure: Permit Processing: Average time (average reduction, number of days) for processing and issuance of grazing permits. (SP)	215 days	210 days	207 days	204 days	200 days

BLM OPERATING PLAN TABLE FY 2004 - 2008

	Measure Name	FY 2004 Target	FY 2005 Target	FY 2006 Target	FY 2007 Target	FY 2008 Target
2.4	End Outcome Goal -- Manage or influence resource use to enhance public benefit, promote responsible use, and ensure optimal value. Forest products.					
2.4.01	End Outcome Measure: Access/PD Volume: Volume of wood products offered consistent with applicable management plans, PD lands. (BUR/SP)	34 MMBF	36 MMBF	40 MMBF	40 MMBF	40 MMBF
2.4.02	End Outcome Measure: Access/O&C Volume: Volume of wood products offered consistent with applicable management plans, O&C lands. (BUR/SP)	150 MMBF	193 MMBF	243 MMBF	285 MMBF	303 MMBF
2.4.03	End Outcome Measure: Access/PD ASQ: Percent of timber offered for sale, PD lands. (BUR/SP)	106%	113%	125%	125%	125%
2.4.04	End Outcome Measure: Access/O&C ASQ: Percent of Allowable Sale Quantity offered for sale, O&C lands. (BUR/SP)	79%	95%	120%	135%	149%
2.4.05	End Outcome Measure: Responsible Use -- Percent of permitted acres maintained at appropriate land conditions and water quality standards. (SP)	100%	100%	100%	100%	100%
2.4.06	End Outcome Measure: Optimal Value: Administrative cost per million board feet of timber offered for sale. (SP)	$165,000	$165,000	$165,000	$165,000	$165,000
3	Mission Area: Recreation					
3.1	End Outcome Goal -- Provide for a quality recreation experience, including access, and enjoyment of natural and cultural resources on DOI managed and partnered lands and waters.					
3.1.01	End Outcome Measure: Satisfaction of meeting public demand for recreation as measured by a general public survey. (SP)	30%	32%	34%	36%	40%
3.1.02	End Outcome Measure: Satisfaction with the quality of recreation experience. (SP)	94%	94%	95%	95%	95%
Intermediate Strategy -- Improve capacities to provide access for recreation where appropriate						
3.1.03	Intermediate Outcome Measure: Recreation Opportunities: Number of acres made available for recreation through management actions and partnerships. (SP)	260,000,000 acres	260,000,000 acres	260,000,000 acres	260,000,000 acres	260,000,000 acres
3.1.04	Intermediate Outcome Measure: Number of river and shoreline miles sustained accessible for recreation through management actions and partnerships. (SP)	14,500 miles	14,500 miles	14,500 miles	14,500 miles	14,500 miles
3.1.05	Intermediate Outcome Measure: Universal Access: Percent of universally accessible facilities in relation to the total number of recreation areas. (SP)	9%	9%	10%	11%	12%
Intermediate Strategy -- Promote recreation opportunities						
3.1.06	Intermediate Outcome Measure: Efficient Transactions: Number of on-line recreation transactions supported by DOI (number of people served, number of transaction opportunities). (SP)	2,500 transactions	3,000 transactions	3,000 transactions	3,000 transactions	3,000 transactions
Intermediate Strategy - Manage recreation activities seamlessly.						
3.1.07	Intermediate Outcome Measure: Expand Resource/Community-Based Collaboration: Percent of recreation areas with community partnerships. (SP)	80%	81%	82%	83%	84%
3.1.08	Intermediate Outcome Measure: One-Stop Access: Number of individuals using interagency pass. (SP)	10,700	10,700	10,700	10,700	10,700
Intermediate Strategy -- Enhance the quality of recreation opportunities						
PENDING	Intermediate Outcome Measure: Facilities Condition: Facilities are in fair or better condition as measured by the Facilities Condition Index. (SP)	This performance measure will replace PM 3.1.09 after the Facilities Condition Index (FCI) is developed by the Department.				
3.1.09	Intermediate Outcome Measure: Facilities Condition: Recreation sites are in fair to good condition as measured by the Facilities Asset Management System (FAMS). (SP/BUR)	82.0%	82.5%	83.0%	83.5%	84.0%
Intermediate Strategy -- Provide effective interpretation and education programs.						
3.1.10	Intermediate Outcome Measure: Facilitated Programs: Number of visitors served by facilitated programs. (BUR)	82,700	83,500	84,300	84,700	85,000
3.1.11	Intermediate Outcome Measure: Interpretation and Education: Satisfaction with the quality of interpretation and environmental education products in Special Recreation Management Areas as measured by a general public survey. (BUR)	72%	77%	82%	87%	92%

BLM OPERATING PLAN TABLE FY 2004 - 2008

	Measure Name	FY 2004 Target	FY 2005 Target	FY 2006 Target	FY 2007 Target	FY 2008 Target
3.2	End Outcome Goal - Provide for and receive fair value in recreation.					
3.2.01	End Outcome Measure: Customer satisfaction with value for fee paid. (SP)	85%	85%	85%	85%	85%
Intermediate Strategy – Promote quality services for recreation						
3.2.02	Intermediate Outcome Measure: Percent of concession activities with performance-based contracts. (SP)	0%	0%	0%	0%	0%
Intermediate Strategy - Effectively manage service fees and recreation fees.						
3.2.03	Intermediate Outcome Measure: Cost per visitor at development and recreational fee demonstration sites. (SP)	Establish Baseline	TBD	TBD	TBD	TBD
4	Mission Area: Serving Communities					
4.1	End Outcome Goal - Protect lives, resources, and property.					
4.1.01	End Outcome Measure: Loss of life from severe, unplanned and unwanted wildland fire is eliminated. (SP)	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set
4.1.02	End Outcome Measure: Firefighter injuries from severe, unplanned and unwanted wildland fire are reduced. (SP)	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set
4.1.03	End Outcome Measure: Wildland Fire: Damage to communities and the environment from severe, unplanned and unwanted wildland fire are reduced. (SP)	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set
4.1.04	End Outcome Measure: Wildland Fire: Amount of time lost from firefighter injury in proportion to the number of days worked (across all agencies). (SP)	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set
4.1.05	End Outcome Measure: Wildland Fire: Number of homes and significant structures lost as a result of wildland fire. (SP)	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set
4.1.06	End Outcome Measure: Law Enforcement -- Visitor lives lost due to illegal activities on DOI lands and in DOI facilities (incidents per 100,000 visitor/resident days). (SP)	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set

BLM OPERATING PLAN TABLE FY 2004 - 2008

	Measure Name	FY 2004 Target	FY 2005 Target	FY 2006 Target	FY 2007 Target	FY 2008 Target
4.1.07	End Outcome Measure: Law Enforcement: Visitor serious injuries due to illegal activities on DOI lands and in DOI facilities (incidents per 100,000 visitor/resident days). (SP)	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set
Intermediate Strategy - Improve fire management						
4.1.08	Intermediate Outcome Measure: Percent of unplanned and unwanted wildland fires controlled during initial attack. (SP)	95%	95%	95%	95%	95%
4.1.09	Intermediate Outcome Measure: Improve Fire Prevention and Suppression: Number of acres burned by unplanned and unwanted wildland fires. (SP)	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set	Report Actuals, Targets Not Set
4.1.10	Intermediate Outcome Measure: Number of acres treated that are in the wildland-urban interface and are identified as high priority through collaboration consistent with the 10-Year Implementation Plan - in total. (SP)	105,00 acres	105,00 acres	105,00 acres	105,00 acres	105,00 acres
4.1.11	Intermediate Outcome Measure: Number of acres treated that are in the wildland-urban interface and are identified as high priority through collaboration consistent with the 10-Year Implementation Plan - as X percent of all acres treated. (SP)	40%	40%	40%	40%	40%
4.1.12	Intermediate Outcome Measure: Number of acres treated in the permitted acres interface per million dollars gross investment. (SP)	3,020 acres	3,020 acres	3,020 acres	3,020 acres	3,020 acres
Intermediate Strategy - Improve public safety and security and protect public resources from damage						
4.1.13	Intermediate Outcome Measure: Mitigate Hazards: Percent of physical and chemical hazards mitigated within 120 days to ensure visitor or public safety. (SP)	10%	10%	10%	10%	10%
4.1.14	Intermediate Outcome Measure: Facility Compliance: Increase the percentage of BLM organizational units rated in good safety, health, and environmental condition. (BUR)	68%	72%	75%	78%	82%
4.1.15	Intermediate Outcome Measure: Buildings (e.g., administrative, employee housing) in fair to good condition as measured by the Facilities Asset Management Systems (FAMS) (SP/BUR)	90%	90%	90%	90%	90%
PENDING	Intermediate Outcome Measure: Facilities Condition: Buildings (e.g., administrative, employee housing) in fair or better condition as measured by the Facilities Condition Index (FCI). (SP)	This performance measure will replace PM 4.1.15 after the Facilities Condition Index (FCI) is developed by the Department.				
4.1.16	Intermediate Outcome Measure: Other facilities, including roads, dams (non-BOR), trails, and bridges (non-BIA) are in fair to good condition as measured by a Facilities Asset Management System (FAMS) (SP/BUR)	Roads = 65%	68%	68%	68%	68%
		Dams = 70%	70%	70%	70%	70%
		Bridges = 97%	97%	97%	97%	97%
		Trails = 67%	70%	70%	70%	70%
PENDING	Intermediate Outcome Measure: Facilities Condition: Other facilities, including roads, dams, trails, bridges are in fair or better condition as measured by the appropriate Facilities Condition Index (FCI). (SP)	This performance measure will replace PM 4.1.16 after the Facilities Conditional Index (FCI) is developed by the Department.				
Intermediate Strategy – Promote respect for private property						
4.1.17	Intermediate Outcome Measure: Title, Boundary and Survey Information: Percent of townships for which DOI has data responsibility, where land status, boundary, and geographic coordinate information are accessible on the internet through the National Integrated Land System (NILS). (BUR)	N/A	N/A	Establish Baseline and Targets	TBD	TBD
4.1.18	Intermediate Outcome Measure: Survey: Percent of cadastral surveys approved within eighteen months of the funding date. (BUR)	N/A	Establish Baseline	TBD	TBD	TBD
4.1.19	Intermediate Outcome Measure: Percent of Federal and Indian lands with modern brass cap surveys. (BUR)	N/A	Establish Baseline	TBD	TBD	TBD
4.1.20	Intermediate Outcome Measure: Alaska Land Conveyances: Cumulative percent of the total acreage required under the Alaska Statehood Act (ASA) and the Alaska Native Claims Settlement Act (ANCSA), as amended by the Alaska National Interest Lands Conservation Act (ANILCA), will be transferred from Bureau administration to the State of Alaska and the Alaska Native Corporations. (BUR)	86.3%	86.7%	87.2%	87.7%	88.2%

BLM OPERATING PLAN TABLE FY 2004 - 2008

	Measure Name	FY 2004 Target	FY 2005 Target	FY 2006 Target	FY 2007 Target	FY 2008 Target
4.1.21	Intermediate Outcome Measure: Land Title Records: Number of public land title records posted on the internet to assist title, survey, historical, and genealogical research and retrieval. (BUR)	200,000 records	200,000 records	200,000 records	200,000 records	200,000 records
4.1.22	Intermediate Outcome Measure: Management Plans: Percent of areas under DOI management or influence covered by current resource management plans based on land use plan evaluations. (BUR)	Establish Baseline	TBD	TBD	TBD	TBD
4.1.23	Intermediate Outcome Measure: Land Conveyances: Increase the acreage of land disposals and conveyances completed out Alaska. (BUR)	100,000 acres	105,000 acres	110,000 acres	115,000 acres	120,000 acres
4.1.24	Intermediate Outcome Measure: Land Exchanges and Acquisitions: Increase the number and acreage of land exchanges and acquisitions to improve land tenure distribution. (BUR)	Establish Baseline	TBD	TBD	TBD	TBD

[1] SP = Department Strategic Plan performance measure.

[2] BUR = Bureau specific performance measure.

[3] DOI non-key = Performance measure developed by the Department, but not part of the Department's strategic plan.

4PART = Bureau specific performance measure developed during OMB's Program Assessment Rating Tool (PART) process.

[5] BUR/SP = Modified DOI Strategic Plan performance measure. Targets and accomplishments will aggregated and reported to the Department under applicable DOI measures.

Bureau of Land Management Performance Measures

1.0 Mission Area Resource Protection	
1.1 End Outcome Goal: Improve Health of Watersheds, Landscapes, and Marine Resources that are DOI Managed or Influenced in a Manner Consistent with Obligations Regarding the Allocation and Use of Water.	
1.1.01	End Outcome Measure: Wetland Areas -- Percent of acres achieving desired conditions where condition is known and where specified in management plans. (DOI Measure) (WO-220)
1.1.02	End Outcome Measure: Riparian Areas -- Percent of riparian miles (stream miles) achieving desired conditions where condition is known and where specified in management plans. (DOI Measure) (WO-220)
1.1.03	End Outcome Measure: Upland Areas -- Percent of acres achieving desired conditions where condition is known and where specified in management plans. (DOI Measure) (WO-220)
1.1.04	End Outcome Measure: Surface Waters -- Percent of surface waters (acres) managed by DOI that meet EPA Approved (State) Water Quality Standards. (DOI Measure) (WO-220)
1.1.05	End Outcome Measure: Surface Waters -- Percent of surface waters (stream miles) managed by DOI that meet EPA Approved (State) Water Quality Standards. (DOI Measure) (WO-220)
1.1.06	End Outcome Measure: Air Quality -- Percent of reporting Class I DOI lands that meet ambient air quality standards (NAAQS). (DOI Measure) (WO-220)
1.1.07	End Outcome Measure: Air Quality -- Percent of reporting Class I DOI lands that meet visibility objectives. (DOI Measure) (WO-220)
1.1.08	End Outcome Measure: Mine Land Areas -- Number of land acres reclaimed or mitigated from the effects of degradation from past mining. (DOI Measure) (WO-360)
Intermediate Strategy: Restore and maintain proper function to watersheds and landscapes.	
1.1.09	Intermediate Outcome Measure: Restore Fire Adapted Ecosystems/Fire Rehabilitation -- Percent of acres degraded by wildland fire with post-fire rehabilitation treatments underway, completed, and monitored. (DOI Measure) (WO-220 / FA-100)
1.1.10	Intermediate Outcome Measure: Restore Fire Adapted Ecosystems/Condition Class -- Number of total acres in fire regimes 1, 2, or 3 that were identified as high priority through collaboration consistent with the 10-year Implementation Plan moved to a better condition class-in total. (DOI Measure) (FA-100)
1.1.11 No Template	Intermediate Outcome Measure: Restore Fire Adapted Ecosystems/Condition Class -- Number of total acres in fire regimes 1, 2, or 3 that were identified as high priority through collaboration consistent with the 10-year Implementation Plan moved to a better condition class-as a percent of total acres. (DOI Measure) (FA-100)
1.1.12	Intermediate Outcome Measure: Restore Fire Adapted Ecosystems/Condition Class -- Number of acres in prior measure (Performance Measure: 1.1.10, above) moved to a better condition class per million dollars of gross investment. (DOI Measure) (FA-100)
1.1.13	Intermediate Outcome Measure: Reduce Hazardous Fuels -- Number of acres treated that are in condition classes 2 or 3 in fire regimes 1-3 outside of WUI, and are identified as high priority through collaboration consistent with the 10-Yr. Implementation Plan in total. (DOI Measure) (FA-100)
1.1.14 No Template	Intermediate Outcome Measure: Reduce Hazardous Fuels -- Number of acres treated that are in condition classes 2 or 3 in fire regimes 1-3 outside of WUI, and are identified as high priority through collaboration consistent with the 10-Yr. Implementation Plan as a percent of all acres treated. (DOI Measure) (FA-100) (Refer to definition template for performance measure 1.1.13)

1.1.15	Intermediate Outcome Measure: Reduce Hazardous Fuels -- Number of acres treated outside the wildland-urban interface per million dollars gross investment. (DOI Measure) (FA-100) (relates to performance measure 1.1.13, above)
1.1.16	Intermediate Outcome Measure: Land Contamination -- Percent of known contaminated sites remediated on DOI managed land. (DOI Measure) (WO-360)
Intermediate Strategy: Improve information base, information management and technical assistance.	
1.1.17	Intermediate Outcome Measure: Forge Effective Partnerships -- Satisfaction scores on resource protection partnerships. (DOI Measure) (WO-830)
1.2. End Outcome Goal: Sustain desired biological communities on DOI managed and influenced lands and waters in a manner consistent with obligations regarding the allocation and use of water.	
1.2.01	End Outcome Measure: Invasive Plant Species -- Percent change from baseline in the number of acres infested with invasive plant species. (DOI Measure) (WO-220)
1.2.02	End Outcome Measure: Threatened & Endangered Species -- Percent of the plant/animal species listed or proposed for ESA listing achieving a stable or increasing trend in their resident populations.
Intermediate Strategy: Create habitat conditions for biological communities to flourish.	
1.2.03	Intermediate Outcome Measure: Habitat Restoration -- Number of stream/shoreline miles restored or enhanced to achieve habitat conditions to support species conservation consistent with management documents, program objectives, and consistent with substantive and procedural requirements of State and Federal water law. (DOI Measure) (WO-230)
1.2.04	Intermediate Outcome Measure: Habitat Restoration -- Number of acres restored or enhanced to achieve habitat conditions to support species conservation consistent with management documents, program objectives, and consistent with substantive and procedural requirements of State and Federal water law.
1.3 End Outcome Goal: Protect Cultural and Natural Heritage Resources.	
1.3.01	End Outcome Measure: Cultural Resource Properties -- Percent of cultural properties on DOI inventory in good condition. (DOI Measure) (WO-240)
1.3.02	End Outcome Measure: Cultural Resource Collections -- Percent of collections in DOI inventory in good condition. (DOI Measure) (WO-240)
1.3.03	End Outcome Measure: Paleontology Localities -- Percent of paleontology localities in DOI inventory in good to fair condition. (DOI Measure) (WO-240)
1.3.04	End Outcome Measure: Natural Heritage Resources -- Percent of Special Management Areas meeting their heritage resource objectives under the authorizing legislation. (DOI Measure) (NLCS & WO-260&mdash;WH&B portion)
Intermediate Strategy: Manage special management areas for natural heritage resource objectives.	
1.3.05	Intermediate Outcome Measure: Wilderness Areas -- Percent of acres of designated wilderness achieving wilderness character objectives as specified by statute. (DOI Measure) (NLCS)
1.3.06	Intermediate Outcome Measure: Wild and Scenic Rivers -- Miles of designated wild and scenic rivers achieving wild and scenic river condition objectives. (DOI Measure, non-key) (NLCS)
1.3.07	Intermediate Outcome Measure: Scenic and Historic Trails -- Percent of miles of designated scenic and historic trails achieving national scenic and historic trial management levels. (DOI Measure, non-key) (NLCS)
	Intermediate Outcome Measure: National Monuments and National Conservation Areas --

1.1.01

Mission Area	1. Resource Protection
End Outcome Goal	1.1 Improve Health of Watersheds, Landscapes, and Marine Resources that are DOI Managed or Influenced in a Manner Consistent with Obligations Regarding the Allocation and Use of Water.
Measure Number/Title	1.1.01: Wetland Areas &ndash; Percent of acres achieving desired conditions where specified in management plans and condition is known, consistent with applicable substantive and procedural requirements of State and Federal water law.
Data Reported	D1: Number of acres of wetlands achieving desired condition. D2: Number of acres of wetlands with desired conditions specified in management plans and condition is known.
Scope of the Measure	The scope of this measure is dictated by the applicable management plans. It specifically includes wetlands that are addressed in management plans and that have desired conditions specified in management plans (including management plans on Federal lands outside DOI and plans developed through partnership with private entities, or state and local government agencies). Acres included under this performance indicator should not be counted under other performance indicators (e.g., riparian areas occurring in wetland areas).
Point of Contact	WO-220: John Christiansen (202-452-7752)
Key Terms/ Definitions	• **Wetlands:** Wetlands vary widely because of regional and local differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors, including human disturbance. Generally, wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface. For the purposes of reporting under this performance measure, the classification of wetlands as defined in the Classification of Wetlands and Deepwater Habitats of the United States, Cowardin, et al, 1979, will be followed. This publication can be found at the following URL: http://wetlands.fws.gov/Pubs_Reports/Class_Manual/class_titlepg.html. For regulatory purposes, the Environmental Protection Agency [EPA regulations at 40 CFR 230.3(t)], define wetlands as &ldquo;those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.&rdquo; • **Desired condition:** The qualitative or quantitative natural resource attributes of the wetland area that are identified through the planning process as the desired outcome of management. The description of desired condition includes measurable objectives for the identified attributes, including physical, chemical, hydrologic, and biologic attributes. The desired condition for a particular area may or may not be the attributes that represent natural conditions or indicate that natural processes predominate in the area. • **Management plan:** A land use plan as defined by a Bureau&rsquo;s law,

	regulation, or policy. For example, BLM&rsquo;s Federal Land Policy and Management Act, FWS&rsquo;s National Wildlife Refuge Improvement Act of 1997. The plan generally designates in a written document land areas and resource uses, condition goals and objectives, program constraints, and management practices. The plan may identify the need for additional detailed step-down plans, support action, implementation sequences, and monitoring standards. Under this measure, the term management plan includes plans developed through partnerships (e.g., plans developed in partnership with other federal, state, and local government entities, and private entities).
Measurement Process	Percent equals 100 times the quotient of the number of acres of wetlands achieving desired conditions divided by the number of acres of wetlands with desired conditions specified in management plans and condition is known. [100 x (D1/D2)] =%.
Reporting Frequency	Annual. This data is also reported annually in the Public Land Statistics (PLS). Data relating to this performance measure will be reported to the DOI on a cumulative basis (i.e., annual accomplishments build upon the accomplishments from previous years).
Reporting Responsibility	National. The WO-220 Group (in coordination with state/field offices) will establish annual targets and report annual accomplishments in the Management Information System for this performance measure. Data for data points D1 and D2 will be obtained from the state/field offices via a data call.
Baseline	There are a total of 12,813,650 acres of wetlands within BLM-managed lands.
Date of Last Change	April 10, 2004
Comments	The BLM will report wetland areas at proper functioning condition (PFC) and functioning at risk with an upward trend as attaining desired condition. This measure coincides with DOI Strategic Plan performance measure: PEM.1.001.

1.1.02

Mission Area	1. Resource Protection
End Outcome Goal	1.1 Improve Health of Watersheds, Landscapes, and Marine Resources that are DOI Managed or Influenced in a Manner Consistent with Obligations Regarding the Allocation and Use of Water.
Measure Number/Title	1.1.02: Riparian Areas - Percent of riparian miles (stream miles) achieving desired conditions where specified in management plans and condition is known, consistent with applicable substantive and procedural requirements of State and Federal water law.
Data Reported	D1: Number of stream-miles achieving desired condition. D2: Number of stream-miles with desired conditions specified in management plans and conditions are known.
Scope of the Measure	The scope of this measure is dictated by the applicable management plans. It specifically includes riparian areas that are addressed in management plans and that have desired conditions specified in those management plans (including management plans on Federal lands outside DOI and plans developed through partnership with private entities, or state and local government agencies).
Point of Contact	WO-220: John Christiansen (202-452-7752)
Key Terms/ Definitions	• **Stream-mile:** A mile as measured along the centerline of the stream channel, including all perennial, intermittent and ephemeral channels with associated riparian areas. • **Desired condition:** The qualitative or quantitative natural resource attributes of the wetland area that are identified through the planning process as the desired outcome of management. The description of desired condition includes measurable objectives for the identified attributes, including physical, chemical, hydrologic, and biologic attributes. The desired condition for a particular area may or may not be the attributes that represent natural conditions or indicate that natural processes predominate in the area. • **Management plan:** A land use plan as defined by a Bureau&rsquo;s law, regulation, or policy. For example, BLM&rsquo;s Federal Land Policy and Management Act, FWS&rsquo;s National Wildlife Refuge Improvement Act of 1997. The plan generally designates in a written document land areas and resource uses, condition goals and objectives, program constraints, and management practices. The plan may identify the need for additional detailed step-down plans, support action, implementation sequences, and monitoring standards. Under this measure, the term management plan includes plans developed through partnerships (e.g., plans developed in partnership with other federal, state, and local government entities, and private entities). • **Riparian area:** The transition zone between permanently saturated wetlands and uplands. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels are typical

	riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil.
Measurement Process	Percent equals 100 times the quotient of the number of riparian miles (stream miles) achieving desired condition divided by the number of riparian miles (stream miles) with desired conditions specified in management plans and condition is known. [100 x (D1/D2)] [124,900 mi. / 136,725 mi. = 91%].
Reporting Frequency	Annual. This data is also reported annually in the Public Land Statistics (PLS). Data relating to this performance measure will be reported to the DOI on a cumulative basis (i.e., annual accomplishments build upon the accomplishments from previous years).
Reporting Responsibility	National: The WO-220 Group (in coordination with state/field offices) will establish annual targets and report annual accomplishments in the Management Information System related to the performance measure. The percent of riparian miles (stream miles) achieving desired conditions where specified in management plans and condition is known will be entered in the Management Information System.
Baseline	The FY 2004 baseline: the BLM manages 136,725 riparian miles.
Date of Last Change	April 4, 2004
Comments	This measure coincides with DOI Strategic Plan performance measure: PEM.1.002.

Strategic Plan for
The *State of the Nation's Ecosystems* Project, 2002-2007

Note: This document is an update and revision to the project's initial draft strategic plan, *The State of the Nation's Ecosystems: Building an Enduring National Resource*, dated February 2003.

Background

The State of the Nation's Ecosystems: Measuring the Lands, Waters, and Living Resources of the United States was released on September 24, 2002. This effort, the product of more than five years work and incorporating contributions from literally hundreds of individuals, was designed as the first in a series of periodic, high-quality, nonpartisan reports on the condition and use of U.S. ecosystems.

The 2002 *State of the Nation's Ecosystems* report was developed using a series of fundamental principles and operational design guidelines, which are described fully in full in Chapters 1 and 2 of the report. Briefly, the basic principles are that the report should strive for scientific credibility and be politically non-partisan, that it should rely upon the expertise of the environmental monitoring profession in its design and execution, and that it should be designed as an adaptive experiment, learning from its early mistakes.

The basic design principles defined the report's primary audience as consisting of decision makers and opinion leaders – those interested in the "big picture" concerning the nation's ecosystems (while recognizing that there are many other potential users, such as those who would use the report for educational purposes). In keeping with the focus on its primary audience, the report includes a succinct, pared-down, set of indicators, rather than an encyclopedic treatment of all facets of ecosystem condition. Further, in describing these indicators, the report avoids value-laden and normative descriptions that could be interpreted as aligning it with a particular political or policy viewpoint.

The report describes the "state" of ecosystems, as contrasted with information on the pressures that might alter ecosystems or the public or private policies and actions taken in response, and includes information on both ecosystem condition and the flows of goods and services that are derived from these systems. Finally, since *The State of the Nation's Ecosystems* was designed as the first in a long-term series, its content was not limited to indicators for which data are already collected; rather a key strategy was to identify indicators about which data *should* be available and to highlight those for which this is not currently the case.

The State of the Nation's Ecosystems had two signature accomplishments:

- It identified a set of ten key characteristics of ecosystems that, taken together, provide a strategic view of the condition and use of any ecosystem[1]. The ten key ecosystem characteristics provide the logical framework for selecting specific indicators, for identifying key national trends affecting multiple systems, and for characterizing differences between systems.
- It defined specific indicators, evaluated data sources, and presented detailed data for these ecosystem characteristics in the nation's six principal ecosystem types[2] as well as for the nation as a whole.

Response to the release of *The State of the Nation's Ecosystems* has been strongly positive. While some commentors identified specific aspects of the report with which they took issue, the overall reaction has been that the report was a very sound first step, which should be continued in the future, consistent with its fundamental approach of adaptive improvement.

This strategic plan begins the process of turning a successful first step into a sound and enduring series. The basic template for the series is to issue full new reports every five years, with updates of the report's web site in each intervening year to accommodate newly released data. The five-year interval is intended to balance the desirability of issuing frequent reports (so as to maintain public visibility and focus), the recognition that environmental conditions often change relatively slowly and that many major monitoring programs do not provide annual or real-time data, and the need to provide enough time for the kind of serious, in-depth reviews that are fundamental to the report's continuous improvement.

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[1] These characteristics describe the area and dimensions of the system, its key chemical and physical characteristics, the condition of biological components, and the goods and services that people derive from the system. See page 11 of *The State of the Nation's Ecosystems*.

[2] Coasts and oceans, farmlands, forests, fresh water ecosystems, grasslands and shrublands, and urban and suburban areas. At a coarse scale, this set is intended to include all the lands and waters of the United States.

Goals for the 2002-2007 *State of the Nation's Ecosystems* Project

I. Ensuring That *The State of the Nation's Ecosystems* Meets Users' Needs

The ultimate goal of the *State of the Nation's Ecosystems* project is to serve as a central core of information that is relied upon in policy discussions about the use and management of the nation's natural resources, much as indicators such as unemployment and inflation are found at the core of economic policy debates. To achieve this goal, the report must be known to those engaged in such discussions, provide information that is accessible to these audiences and relevant to the types of issues and levels of decision they face, and be viewed by them as credible and non-partisan.

A key set of steps to be undertaken in the 2002-2007 period will be directed at

- Identifying and evaluating the strengths and weaknesses of the 2002 *State of the Nation's Ecosystems* report and more clearly defining the benefits that the report offers to users. The goal is to understand how and why people might use the report, ultimately to ensure that the report meets these needs. Tools currently under consideration to meet this goal include formal evaluations as well as less-formal feedback mechanisms that accompanying the report's presentation to a wide variety of audiences.

- Stimulating the use of the report in natural resource and environmental management discussions. This will involve a broadening of outreach efforts beyond simply informing people about the project, to finding ways to expand its use by managers and decision makers, while ensuring that the project's impartial stance is maintained. Examples might include panel discussions, in which advocates, regulators, and others discuss the implications of data reported about particular indicators. In addition, although the Center will not undertake regional pilot projects at this time, local and regional applications of the report's framework by others should be encouraged.

II. Refining the Content of the Next *State of the Nation's Ecosystems* Report

Refining and improving the content of the report is a fundamental goal for the *State of the Nation's Ecosystems* project between now and 2007. The following are key elements for achieving this goal:

Strengthening the "Core National Indicators." The 2002 *State of the Nation's Ecosystems* report included a small set of *core national indicators*, whose purpose was to provide the most strategic view of overall ecosystem conditions and use. As with urban / suburban indicators (see below), the field of development and use of indicators at this scale is relatively new. For example, the 2000 publication of *Ecological Indicators for the Nation* (National Research Council, 2000) provided the first serious, ecologically-grounded, treatment of and conceptual basis for highly aggregated indicators describing overall national ecological condition[3]. The 2002 Report's suite of *core national indicators*, while credible and well-grounded, was relatively weakly developed (compared to, for example, the forest indicators, which benefited from a long and rich history of science and indicator development).

These indicators have the potential to serve as a unifying element for indicators in the individual ecosystem sections, and to link national-scale indicators with those designed for use at other geographic scales.

The review of the core national indicators will have several goals—all of them related to ensuring consistency in how *The State of the Nation's Ecosystems* describes the key characteristics of ecosystems. The first goal will be to take advantage of, and create linkages to, the work being done to improve the consistency of similar indicators across ecosystems (described below). Ultimately, it would be desirable to present data on key ecosystem characteristics in a consistent fashion for the nation as a whole, and to have concrete linkages to the indicators for each of the six principal ecosystem types. A second goal will be to explore ways to improve the overall integration of these indicators—to ensure that they are more than a simple listing of key ecosystem characteristics, and in fact can be used to describe a functioning ecosystem in an integrated way. In this regard, the project will benefit from work being done to develop integrated indicator sets at local and regional levels. A third, and related, goal will be to make the national indicators useful at other geographic scales as well, thus increasing the consistency between how ecosystems at a local or regional scale are described and how ecosystems at a national scale are described. (See below for additional activities the Center will undertake to explore opportunities for presenting data at regional and local scales.)

Improving consistency between indicators across ecosystems. The 2002 *State of the Nation's Ecosystems* report was based on a framework that ensured an important, and perhaps unprecedented, level of consistency between the indicators presented for different ecosystems. The framework of ten key ecosystem characteristics ensured that the indicators for each system described a compatible set of topics. However, this consistency was not maintained at the level of the specific indicators, so it is possible that two ecosystems might have indicators describing the same general topic (as required by the framework), but do so using different indicators. Thus, the indicators—while perfectly adequate for describing a specific ecosystem—support neither cross-system comparison or "rolling up" to develop a national perspective on that characteristic.

We will convene multi-sector working groups, with experts familiar with the range of relevant ecosystems, to review each of several major suites of indicators. Initially, this cross-ecosystem work will focus on indicators describing landscape patterns, including fragmentation, and non-native species[4]. Additional candidates, to for this treatment include stream habitat / riparian area indicators, chemical contaminant indicators, and indicators of species in highly altered systems.

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[3] The chair of the NRC committee that produced this report is a member of the Design Committee, which guides the *State of the Nation's Ecosystems* project.

[4] A Non-native Species Task Group has been convened for this purpose and has met three times (as of September 1, 2003) and the first meeting of the Spatial Pattern Task Group is scheduled for October 2003.

In addition to improving cross-ecosystem consistency, the project will endeavor to improve less robust indicator suites. One of these, the *core national indicators*, will be the primary focus of attention (see above), but a logical second candidate is the setoff urban / suburban indicators. The 2002 *State of the Nation's Ecosystems* report reflected the current state of knowledge and thinking about ecosystem functioning and how that functioning should be reflected in indicator sets. For urban / suburban areas, the relative lack of development is illustrated by the fact that the National Science Foundation, which established the Long Term Ecological Research network in 1980, only added an urban component (with sites in Baltimore and Phoenix[5]) in 1997. If time and resources permit, the Center will convene a multi-sector working group to conduct overall reviews of the urban / suburban indicator suite.

Fostering needed "indicator development." The 2002 *State of the Nation's Ecosystems* report labeled fourteen indicators as "needing further development.[6]" These indicators represented instances in which it was clear that the general ecosystem characteristic was important to describe, but the specific quantitative metric was not clear. In some of these cases, such as indicators of the extent and duration of harmful algal blooms, relatively minor enhancements are needed to fully define an indicator, while in others, such as how to describe changing land use patterns at the suburban-rural fringe (often called "sprawl"), there are wide differences of opinion as to how to approach the phenomenon, and substantial additional work will be necessary to reach consensus.

Several of these indicators will be addressed as part of the cross-cutting and "less-robust" indicator work described above. Other indicators will be addressed through a variety of consultative mechanisms, as time and resources permit.

Improving the presentation of indicator data. The 2002 *State of the Nation's Ecosystems* report presented data on those indicators for which they were available in a simple, straightforward, easy-to-use and easy-to-understand fashion. This presentation was in part intended to avoid introducing potentially controversial assumptions about cause and effect relationships between indicators, and to refrain from normative statements that often characterize such assessment discussions. However, the lack of an integrated presentation of the indicators was cited by many reviewers as a significant concern, which potentially reduced the accessibility of the report to many audiences.

The Center will explore several approaches to presenting indicators in a more integrated fashion. It may be possible to delineate the linkages between indicators, thus creating better, more integrated "stories". Conceptual models might be developed for each ecosystem to describe the relationships between the various indicators. This phase will likely include development of one or more prototypes of more integrated presentations, followed by the development of an approach for accomplishing this throughout the report.

Providing data at regional and local scales. The 2002 *State of the Nation's Ecosystems* report focused on ecosystem conditions at the national scale, and this focus will continue to dominate future reports. However, many users wish to view indicator data for specific locales, and it is the Center's view that encouraging such use is highly desirable, because it advances the goal of ensuring that the report and its indicators are well integrated into the national dialog over natural resource management and use. However, such application is not currently supported by the report's web site or by many of the data systems on which the report relies. Adding the capability to allow the report's users to "drill down" to regional or local views of specific indicators will require complex interfaces with the multiple systems from which the report's data are derived. The Center will explore options for providing this capability, although it is highly likely that this ability will be quite constrained in the 2007 report, because of limitations in the underlying data and data systems. The Center will endeavor to identify at least a pilot set of indicators for which this is possible, and present these as a demonstration of the potential for future reports. A related opportunity that will be explored is the potential to allow users to view data on multiple indicators at a single time.

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[5] Principal investigators from these two sites participated on the Center's Urban / Suburban Work Group for the 2002 report.

[6] These indicators are listed on page 200 of the Report.

Improving the report's technical documentation. The 2002 *State of the Nation's Ecosystems* included a "technical note" for each indicator. These notes provided an opportunity to elaborate on the necessarily brief indicator descriptions in the body of the report, and to provide basic descriptions of data sources. These notes were not consistent in their length and depth, and in the degree to which they provided a well-documented description of the conceptual basis for the indicator and a critical assessment of the data sets used in the report.

The Center will develop an approach to strengthening the technical notes and making them more consistent. A common format will be developed, covering at least the conceptual basis for the importance of the indicator, in addition to the source of and access to the data, and a critical assessment of the strengths and weaknesses of the data. In addition, the technical notes might present an opportunity to include a summary of the state of knowledge about the stressors affecting a particular indicator, although this would have to be very carefully done.

Designing an orderly refinement and updating process. The 2002 *State of the Nation's Ecosystems* report was intended as the first in a continuing series, and the refinements and improvements necessary to produce the 2007 report are being undertaken in an open and transparent manner. However, ultimately, such refinements and alterations to the basic indicator set should be made in a structured and orderly fashion, according to reasonably well-defined guidelines, such as exist for adjustment of major economic indices. Clearly, these rules will need to be more flexible initially, but eventually the goal should be to move to a conservative indicator list, with changes at the margin.

III. Sustaining and Enhancing the System for Reporting on the State of the Nation's Ecosystems

The Center's report on *The State of the Nation's Ecosystems* is possible only because of the existence, in the federal government and elsewhere, of a large and sophisticated infrastructure for gathering, storing, and analyzing data about the nation's natural resources. A strong reporting effort for the future will require that this infrastructure itself is strong, and that mechanisms be in place for drawing attention to parts of it that may be missing, weakening or in peril. In addition, a healthy long-term reporting effort will require institutional arrangements for refining indicator definitions, adding or subtracting indicators, and periodically reporting indicator values.

Mapping the System: A key aspect of ensuring the long-term health of the monitoring and reporting systems necessary for reporting on the state of the nation's ecosystems is understanding the nature of these systems and their relationships and interdependencies. Thus, the Center will develop a "map" or conceptual model of the overall ecosystem reporting system. This "map" will identify and define the characteristics of institutions that generate and store raw data, add or subtract indicators, revise indicator definitions, and periodically report and interpret indicator values. This map should define each of the key roles necessary for national ecosystem reporting, identify both the institutional characteristics that would be associated with their most effective execution and the necessary interdependencies between roles and institutions, and identify both institutions currently undertaking these functions and any gaps in institutional coverage. This report might also address the failures and successes of other reporting efforts, as well as the long-term resources needed to sustain The State of the Nation's Ecosystems.

Reporting on the State of the System: The Center will prepare periodic reports on the state of the monitoring and reporting infrastructure necessary to report on the state of the nation's ecosystems. These reports, the first of which is targeted for completion in early- to mid-2004, will include two key elements.

- A ***data gaps*** component. This element of the report will focus on those indicators that could not be reported on in the 2002 report because high quality, nationally consistent data sets do not exist. This section of the report will include information on the costs[7] that would be incurred in filling the data gaps identified in the 2002 report, the feasibility of filling various gaps, and the priority that should be placed on filling these gaps.

  Work on this element will include consultations with data providers regarding the approximate costs that would be incurred to provide data for specific indicators and on the feasibility of implementing such monitoring or reporting on an operational basis. Feedback from users and practitioners will be used in determining which indicators deserve the most urgent attention. (Consultation with data providers is underway, and a survey of nearly 300 experts and interested parties has been largely completed, as of the drafting of this revised plan in Summer 2003.)

- A ***system maintenance*** component. This element of the report will address the ability of the programs and systems relied upon for data in the 2002 report to continue to provide data for future reports. The goal will be to identify and highlight those instances in which changes in program priorities, reductions in available resources, or other factors might result in an erosion of the ability of a program to deliver information needed for future reporting.

  This element will be based largely on consultations with managers and decision makers familiar with various data systems.

Expanding the Indicators Knowledge Base. The Center believes that it is important to encourage development of a US research program on ecosystem indicators. Fundamental research on indicators and ecological processes is crucial to the long-term success of a reporting effort. The Center and its collaborators in *State of the Nation's Ecosystems* project can work with groups like the National Research Council, the Ecological Society of America, and other professional groups, to make this point and to develop a consensus about the focus of such a research program.

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[7] Cost information will be of sufficient quality and precision for use in strategic planning, but will likely not generally be of sufficient precision to support detailed program development or budget allocations. This information is intended to provide an order-of-magnitude indication of costs.

IV. Providing Annual updates of the Report

In addition to providing substantial revisions to the report on a five-year cycle, the Heinz Center will issue annual updates of the web content of the report. The core concept for these updates is that they present a simple opportunity to insert newly released data, while leaving more substantial indicator revisions to the five-year revisions. These annual updates, while conceptually simple, provide a continuing opportunity to educate readers about both the report itself and the changing environmental conditions it describes.

V. Maintaining and Expanding Connections to Other Indicator Efforts

It will be important for project to continue and expand its engagement with other entities that are developing or producing indicator projects, primarily at the national level, but at local, regional, and international levels as well. These include the "roundtables" on sustainable forests, water resources, rangelands, and minerals[8], Council on Environmental Quality's Interagency Work Group on Indicator Coordination, the General Accounting Office's Key National Indicators Project, Millennium Ecosystem Assessment, the United Nations Commission on Sustainable Development, and others as appropriate. The goals are to ensure these groups are familiar with the State of the Nation's Ecosystems project, to develop effective means to interact with them, to understand how other efforts affect the sustainability of the State of the Nation's Ecosystems project, and how activities being undertaken by these related efforts affect priorities for indicator refinement. (For example, the release of the U.S. National Report on Sustainable Forests will likely correspond with a re-examination, in both domestic and international circles, of the "criteria and indicators" that underlie this report. This might present important opportunities for collaboration and closer alignment.)

VI. Preparing the 2007 Report

In addition to the goals outlined above, the Heinz Center will produce and disseminate the second *State of the Nation's Ecosystems* report in 2007. This activity involves aggregation of the research undertaken on each of the substantive tasks outlined above, preparation of review drafts, modifications in response to comments, preparation and production of the final report, and dissemination of the report to interested parties.

This process is both labor intensive and time consuming. For example, we will undertake two separate rounds of review. The first will be for project participants, which numbered well over one hundred for the 2002 report, and will likely do so again. This review is intended to ensure that the draft reflects accurately the decisions made in various working groups and committees, and that in aggregate, the report reflects what participants believe is appropriate, factual, and balanced. The second round involves independent researchers, experts, and advocates, and is intended to ensure that the report is technically excellent, that its tone is unbiased, and that facts are presented in a neutral fashion.

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[8] Full titles for these groups are: Roundtable on Sustainable Forests, the Sustainable Rangelands Roundtable, the Sustainable Water Resources Roundtable, and the Sustainable Minerals Roundtable.

(revised September 30, 2003)

Landscape Pattern Indicators in *The State of the Nation's Ecosystems*: Background and General Charge to a Landscape Pattern Task Group

I. Introduction

In September 2002, the Heinz Center released *The State of the Nation's Ecosystems*, which lays the foundation for periodic, high-quality, non-partisan reporting on the condition and use of our nation's ecosystems.

This report was developed over a five-year period by experts from business, environmental, academic, and federal, state, and local government institutions. The goal was to select a set of indicators that would provide a strategic view of key aspects of ecosystem condition, to serve as the basis for periodic reporting to decision makers and the public.

The report includes indicators for each of the six principal ecosystem types in the U.S. (coasts and oceans, farmlands, forests, fresh waters, grasslands and shrublands, and urban and suburban areas), and for the nation as a whole. These 103 indicators describe 10 major characteristics, which can be grouped into four broad categories: the basic dimensions of the system, chemical and physical conditions, biological components, and human uses (See Table 1).

Indicators of "system dimensions" for the various ecosystem types describe both the amount of the ecosystem, or extent, and, for the terrestrial systems, a variety of landscape pattern features. Indicators of pattern typically measure the degree to which a landscape has been fragmented. Seven indicators address landscape pattern (see Table 2), two of which are completely undefined and three of which do not yet have data available. Please refer to the *State of the Nation's Ecosystems* for a complete treatment of each of these indicators.

It is clear from a brief review of Table 2 that the suite of pattern indicators are as different as they are similar. These indicators were selected by work groups focused on specific ecosystems (e.g., forests) rather than by a group of experts conversant in issues of landscape pattern and fragmentation who were trying to develop a coherent suite of indicators. No attempt was made to force uniformity across systems, however, it would be beneficial to increase the consistency and coherence of this group of indicators in order to be able to communicate broad trends clearly to policymakers and the public. Indeed, reviewing several suites of indicators, including those for non-native species and landscape pattern, from a cross-ecosystem perspective is one of several primary objectives of the *State of the Nation's Ecosystems* project as we work toward the release of the next major edition of the report in 2007.

Further, it is critical that the individual indicators be as meaningful as possible. For example, the Forest Pattern and Fragmentation indicator achieved modest acceptance within the Forest Work Group, however, it is particularly difficult to explain its meaning to a lay audience—including our target audience of high-level opinion leaders and policy makers. In this case, more understandable indicator concepts were dropped due to their controversial nature. This leads to the most difficult aspect of these pattern indicators, which is the implicit or explicit link that is made between the indicator and habitat quality. It is anticipated that the Task Group will first consider this issue in a general sense, essentially developing a framework for what national-level indicators of landscape pattern should address. That is, such a framework will address the major influences that landscape pattern has on habitat quality and ecosystem functioning, and identifying which ones are the most crucial to be captured by a small number of indicators[1]. Then, the group can transition to discussing what the relevant indicators should be for the various ecosystem types.

Table 1: Ecosystem characteristics and indicator focus in *The State of the Nation's Ecosystems*

Ecosystem Characteristic	**What Do The Indicators Measure?**
System Dimensions	
Extent	How much area does an ecosystem or land cover type occupy?
Fragmentation and Landscape Pattern	What are the shapes and sizes of patches of an ecosystem type, and how are they intermingled with one another?
Chemical and Physical Conditions	
Nutrients, Carbon, Oxygen	How much nitrogen, phosphorus, oxygen and carbon are found in different systems?
Chemical Contaminants	How many synthetic compounds and heavy metals are found in ecosystems, and how often do these compounds exceed regulatory or advisory thresholds? (For urban / suburban areas, we also include air pollution from ozone in this category.)
Physical Conditions	What is the condition of key aspects of the physical makeup of an ecosystem, such as the temperature of the water or the amount of salt in the soil?
Biological Components	
Plants and Animals	What is the status of native and non-native plant and animal species?
Biological Communities	What is the condition of the plant and animal communities that make up an ecosystem?
Ecological Productivity	What are the trends in plant growth on land and in the water?
Human Use	
Food, Fiber, and Water	How is the amount and quality of key ecosystem products changing over time?
Other Services, Including Recreation	How often do people take part in outdoor recreation activities, and what other services, such as soil building and flood protection, are provided by natural ecosystems?

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[1] Note that there are at least two pattern indicators that basically do not have a link with habitat quality—they are discussed in more detail in conjunction with Table 3 below.

II. Creating a Fragmentation "Task Group"

We plan to convene a "task group" of between 10 and 15 experts knowledgeable about issues related to the design of indicators of landscape pattern.

The group will be challenged to develop a framework for addressing landscape pattern indicators in a national report of ecosystem status. In developing this framework, the group will have to grapple with how to consider the wide variety of effects that fragmentation and other spatial patterns can have on landscape quality in designing indicators." This is discussed in more detail in Section III below.

After agreeing on a framework for such indicators, the group's second objective will be to determine whether it is possible—and sensible—to identify a suite of indicators that is more consistent and uniform than the present suite, while still retaining important ecological distinctions. If such a suite is advisable, the group will also be asked to recommend the specific indicators that should be tracked in each ecosystem.

A final objective will be for the group to weigh in on the decisions made independently by the Coasts and Oceans and Freshwater work groups to exclude indicators of landscape pattern. These omissions were conscious choices made by the relevant groups, however, we anticipate that this new task group will want to re-visit these decisions.

Timetable & Outcomes

It is expected that this Task Group will meet from 3 to 4 times over an eighteen-month period, beginning during the fall of 2003. Individual meetings typically are held in Washington, DC and run one and one-half days to allow for return travel on the second day.

This Task Group activity will be instrumental in improving the indicators in the 2007 edition of *The State of the Nation's Ecosystems*. In addition, it is expected that one or more stand-alone publications will come from the group's work.

Table 2: Landscape Pattern Indicators in *The State of the Nation's Ecosystems*

Indicator Title	**Description**	**Development & Data Status**	Page in *State of the Nation's Ecosystems*
Core National Indicators			
Fragmentation and Landscape Pattern	The concept is that this indicator will capture fragmentation across multiple ecosystem types.	Indicator not defined	Indicator, p. 44 no Tech. Note
Coasts and Oceans			
no indicator			
Farmlands			
Fragmentation of Farmland Landscape by Development	The degree to which suburban development and other built-up areas break up the farmland landscape.	Indicator defined, data available but not processed	Indicator, p. 93 Tech. Note, p. 231
Shape of "Natural" Patches in the Farmland Landscape	The shape of patches of "natural" lands (i.e., forests, grasslands and shrublands, wetlands, and Conservation Reserve Program (CRP) lands) described based on perimeter-to-area ratios. There will be three classes of patch shape: compact (e.g., circular), intermediate, and elongated (e.g., narrow rectangle).	Indicator defined, data available but not processed	Indicator, p. 94 Tech. Note, p. 232
Forests			
Forest Pattern and Fragmentation	Conveys whether or not "points" in forests are surrounded by little, some, or a lot of forest. In reality each point is a pixel of satellite data (30 m x 30 m). Points surrounded by at least 250 feet of mostly forested land has a forested "immediate" neighborhood. Points surrounded by about ¼ mile of mostly forested lands are considered to have a forested "local" neighborhood. And, points surrounded by 2.5 miles of forest have a forested "larger" neighborhood.	Indicator defined and data available	Indicator, p. 120 Tech. Note, p. 240
Fresh Waters			
no indicator			
Grasslands and Shrublands			
Area and Size of Grassland and Shrubland Patches	The fraction of grassland area and shrubland area that is in patches of different sizes. Patches of grassland or shrubland are identified separately, and the total area occupied by patches of a certain size will be reported as a percentage of the total area of either grasslands or shrublands.	Indicator defined, data available but not processed	Indicator, p. 163 Tech. Note, p. 258
Urban and Suburban Areas			
Patches of Forest, Grassland and Shrubland, and Wetlands	How much of the "natural" area within urban and suburban lands is in patches of varying size, from less than 10 acres to greater than 10,000 acres. Natural areas include forests, grasslands and shrublands (including most pasturelands—especially in the west), and wetlands.	Indicator defined and data available	Indicator, p. 183 Tech. Note, p. 266
Suburban/Rural Land Use Change	The concept is that this indicator will describe the pattern and intensity, or density, of development, both at the outer edge of suburban development around cities, and in rural areas that, despite the lack of a large town center, are growing rapidly toward suburban densities.	Indicator not defined	Indicator, p. 182 No Tech. Note

III. Major Challenges

The Task Group must keep in mind a conclusion drawn by Andrén (1994) in his review of the effects of habitat fragmentation on birds and mammals:

> In most landscapes the total area of suitable habitat will be of greater importance than its spatial arrangements for species living in this particular habitat. This is especially true for landscapes with a high proportion (more than 30%) of the suitable habitat left.

In addition, the group will need to be sensitive to the attitude reflected by a reviewer who said that the Shape of Natural Patches in the Farmland Landscape amounts to "data in search of a question" (see also Villard 2002).

***

Fragmentation processes, both natural and anthropogenic, have lasting impacts on landscapes. Yet, the impacts of fragmentation on habitat quality are a matter of great contention. The source of this contention appears to be firmly rooted in the fact that different species of plants and animals respond to fragmentation differently. This fact is further complicated because *The State of the Nation's Ecosystems* is a coarse-grained approach, meaning that a single indicator, or at most two, needs to represent an entire ecosystem type (e.g., grasslands and shrublands) rather than being targeted at a single species in a single situation (e.g., salamanders in western coniferous forests).

There is an explicit assumption made in the 2002 Report that most of the measures of landscape pattern (or fragmentation) are indicators of habitat quality (Table 3). That is, these indicators make the following types of statements:

> The size and shape of these often small and isolated remnants [of natural lands], along with restored conservation areas (e.g., CRP land), directly influence the amount and type of ecosystem services provided. Habitat fragmentation may create new kinds of habitats that are colonized by generalist native species or exotic species. For example, small patches and long narrow ones may have little or no "interior" habitat. Since some species thrive only in interior habitat—where there is a relatively large and contiguous area of forest, grassland, or other natural cover (see the forest fragmentation indicator), small narrow areas may not provide habitat for these species. On the other hand, narrow strips may function quite well for erosion and sediment control. (Farmlands, p. 94)
>
> "Forest fragmentation" describes the degree to which forested areas are being broken into smaller patches and interspersed with nonforest areas. Research has shown that forest close to nonforest cover is often warmer and drier, more likely to be affected by wind, and more likely to be invaded by non-native species. In addition, forest animals that live near developed areas, farmlands, or roads are more likely to be affected by collisions with cars, increased hunting pressure, noise, lights, predation by cats and dogs, etc. (Forests, p. 120)

However, the literature on the direct link between landscape fragmentation and ecological impacts is equivocal (e.g., Andrén 1994; Chalfoun et al. 2002; Debinski and Holt 2000; Forman and Alexander 1998; Lahti 2001; Lugo and Gucinski 2000; Saunders et al. 1991; Trombulak and Frissell. 2000; Villard 2002). For this reason, the presentations in the 2002 Report are not without caveats, such as the one in the Forests chapter:

> These effects may be felt at different distances from the nonforest edge. In addition, some species are quite sensitive to these effects, while others are less affected. Because these variations in both effect and response by species mean that there is no single distance threshold for the extent of such effects, this indicator presents a range of different neighborhood sizes. (Forests, p. 120)

There is a wide array of other indicators in the 2002 Report that address habitat quality (Table 3), some more directly than others. The underlying challenge to the Task Group will be to establish an approach to developing robust indicators that link landscape pattern to habitat quality.

Table 3: Indicators in *The State of the Nation's Ecosystems* that deal either with landscape pattern and/or habitat quality.

Those landscape pattern indicators using fragmentation as a proxy for habitat quality:
shape of natural patches in the farmland landscape
forest pattern and fragmentation
area and size of grassland and shrubland patches (alteration of fire regime is included as a result of fragmentation in this ecosystem)
patches of forest, grassland and shrubland, and wetlands in urban areas (includes both habitat quality and visual and recreational benefits)
Those landscape pattern indicators that do not primarily address habitat quality—both deal with urban/suburban development:
fragmentation of farmland landscapes by development (economic, visual, recreational)
suburban/rural land use change (some talk of habitat)
Other indicators of habitat quality:
condition of bottom-dwelling animals (Coasts and Oceans)
soil biological condition (Farmlands)
stream habitat quality (Farmlands)
forest age
fire frequency (Forests; Grasslands and Shrublands)
forest community types with significantly reduced area
status of freshwater animal communities
at-risk freshwater plant communities
stream habitat quality (Freshwater)
riparian condition (Grasslands and Shrublands)
status of animal communities in urban and suburban streams
the various non-native species indicators
depending on one's perspective, the basic ecosystem extent indicators provide information about habitat quality

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Invasive Species Indicators in *The State of the Nation's Ecosystems*: Background and General Charge to a Non-Native Species Task Group

I. Introduction

In September 2002, the Heinz Center released *The State of the Nation's Ecosystems*, which lays the foundation for periodic, high-quality, non-partisan reporting on the condition and use of our nation's ecosystems.

This report was developed over a five-year period by experts from business, environmental, academic, and federal, state, and local government institutions. The goal was to select a set of indicators that would provide a strategic view of key aspects of ecosystem condition, to serve as the basis for periodic reporting to decision makers and the public.

The report includes indicators for each of the six principal ecosystem types in the U.S. (coasts and oceans, farmlands, forests, fresh waters, grasslands and shrublands, and urban and suburban areas), and for the nation as a whole. These 103 indicators describe 10 major characteristics, which can be grouped into four broad categories: the basic dimensions of the system, chemical and physical conditions, biological components, and human uses. (See Table 1).

"Biological components" indicators were divided into two major groups: *plants and animals* and *biological communities*[1]. The former group focuses on species-level indicators, and includes at-risk native species, unusual mortality events, and non-native species. Seven indicators that address "non-native" or "invasive" species were included. These seven indicators are described briefly in Table 2, and more fully in the Appendix (please refer to the *State of the Nation's Ecosystems* for a complete treatment of each of these indicators).

A review of Table 2 shows that there are some similarities among the indicators, but their diversity—or lack of consistency—is obvious as well. These indicators were selected by work groups focused on specific ecosystems (e.g., forests) rather than by a group of experts on invasive species trying to develop a coherent suite of indicators. No attempt was made to force uniformity across systems, and the result is that—even if data were available—it would not be possible to describe broad trends in the non-native situation across the various ecosystem types.

From a reader's perspective, and to communicate broad trends clearly to policymakers and the public, it would be very beneficial to increase the consistency and coherence of this group of indicators. We recognize, however, that there may remain important reasons to measure and report different aspects of non-native species status and trends in different media (i.e., aquatic, terrestrial systems), different systems (farmlands, forests), or for different taxonomic groups (animals, plants).

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[1] Note also that there were two indicators of "ecological productivity" in the 2002 *State of the Nation's Ecosystems* report: a terrestrial plant growth index and an indicator of chlorophyll concentrations in the coastal ocean.

Table 1: Ecosystem characteristics and indicator focus in *The State of the Nation's Ecosystems*

Ecosystem Characteristic	What Do The Indicators Measure?
System Dimensions	
Extent	How much area does an ecosystem or land cover type occupy?
Fragmentation and Landscape Pattern	What are the shapes and sizes of patches of an ecosystem type, and how are they intermingled with one another?
Chemical and Physical Conditions	
Nutrients, Carbon, Oxygen	How much nitrogen, phosphorus, oxygen and carbon are found in different systems?
Chemical Contaminants	How many synthetic compounds and heavy metals are found in ecosystems, and how often do these compounds exceed regulatory or advisory thresholds? (For urban / suburban areas, we also include air pollution from ozone in this category.)
Physical Conditions	What is the condition of key aspects of the physical makeup of an ecosystem, such as the temperature of the water or the amount of salt in the soil?
Biological Components	
Plants and Animals	What is the status of native and non-native plant and animal species?
Biological Communities	What is the condition of the plant and animal communities that make up an ecosystem?
Ecological Productivity	What are the trends in plant growth on land and in the water?
Human Use	
Food, Fiber, and Water	How is the amount and quality of key ecosystem products changing over time?
Other Services, Including Recreation	How often do people take part in outdoor recreation activities, and what other services, such as soil building and flood protection, are provided by natural ecosystems?

II. Creating a Non-Native "Task Group"

We plan to convene a "task group" of between 8 and 15 experts knowledgeable about issues related to the design of indicators for tracking the extent and spread of non-native species. The key objective of this task group will be to determine whether it is possible to identify a suite of indicators that is more consistent and uniform than the present suite, while still retaining important ecological distinctions. If such a suite is possible and desirable, the group will also to recommend the specific indicators that should be tracked in each ecosystem.

Beyond this main goal, the group will work to strengthen the conceptual basis of some of the indicators, improve the consistency of terminology, and provide a knowledge base to help identify emerging data sets applicable to these indicators.

Creating a coherent and easily accessible set of these indicators is a key objective of the Heinz Center's *State of the Nation's Ecosystems* project, and a key component of work underway to develop a second edition of the report, scheduled for completion in 2007.

However, the work of this task group will also further a key objective outlined in Executive Order (EO) 13112, signed February 3, 1999:

> *The Invasive Species Council ...shall facilitate development of a coordinated network among Federal agencies to document ... impacts from invasive species ... [and] facilitate establishment of a coordinated, up-to-date information system...*

In addition, success in this work will also fulfill a key recommendation of a recent National Research Council committee (NRC, 2002), which recommended that:

> *A consensus on procedures to measure the impact of invasive species should be forged in the scientific and regulatory communities, and there should be more reporting of impacts of invasive species with standardized measures. (Recommendation 7)*

In addition, and perhaps most importantly, creation of a coherent set of indicators that will enable tracking of the spread of non-native species will provide the nation with a tool to understand and evaluate the success of efforts undertaken by a variety of public and private entities to reduce the impacts these species have on ecological resources and economic systems.

Table 2: Non-Native Species Indicators in *The State of the Nation's Ecosystems*

Indicator Title	**Description**	Page in *State of the Nation's Ecosystems*
Coasts and Oceans		
Non-native Species	percentage of major estuaries with high, medium, or low influence by non-native species. "Influence" is defined by both percentage of species and degree to which they occupy available habitat	Indicator: 76 Tech. Note: 222
Farmlands		
Native Vegetation in Areas Dominated by Croplands	In areas with large amounts of croplands, proportion of remaining "natural" areas that are covered by native plants	Indicator: 104 Tech. Note: 237
Forests		
Area Covered by Non-native Plants	percentage of understory and overstory covered by non-native plants	Indicator: 125 Tech. Note: 242
Fresh Waters		
Non-native Species	percentage of watersheds having different numbers of non-native species with established breeding populations; the preferred indicator would distinguish invasive from non-invasive, and perhaps focus on a defined list of species of particular concern.	Indicator: 145 Tech. Note: 251
Grasslands and Shrublands		
Non-native Plant Cover	percentage of plant cover that is made up of non-native species. Will report on both invasive non-natives and all non-natives.	Indicator: 169 Tech. Note: 261
Population Trends in Invasive and Non-invasive Grassland/ Shrubland Birds	comparison of population trends of native, non-invasive bird species to invasive birds species (can be both non-native and native)	Indicator: 170 Tech. Note: 262
Urban and Suburban Areas		
Disruptive Species	the number and type of disruptive species found in metropolitan areas. Disruptive species can be both non-native and native and are defined as those that have negative effects on natural areas and native species or cause damage to people or property.	Indicator: 192 No tech. note

Task Group Outcomes and Timetable

The specific goals of this Task Group are:

1. *Identify a suite of indicators of non-native species status, as a refinement of the suite included in the 2002* State of the Nation's Ecosystems *report*. This suite will be described in sufficient detail to allow a determination as to whether specific data sources are appropriate for reporting on the various indicators. (As noted above, this objective will not be one of achieving mindless consistency, but rather achieving as much consistency as makes sense.)

   As part of this element, the Task Group should endeavor to address all relevant issues of definition, terminology, and indicator coverage in as consistent a fashion as possible. These issues are discussed in Section III, Terminology and Section IV, Major Challenges.

2. *Identify and evaluate the appropriateness of available data sources for reporting on the new / revised suite of indicators*. If, as is unfortunately likely to be the case, adequate data for national reporting are not available, the Task Group should provide sufficient guidance to the Heinz Center to enable assessments to be made concerning what monitoring / data collection activities would be required for adequate reporting.

We expect that the product of this Task Group will be a summary report or paper to be published by the Heinz Center or submitted to a journal or other outlet (or both).

We expect this Task Group to be in existence for approximately 18 months, and to have three two-day meetings over that period. This Task Group will probably have its first meeting in early February 2003. The Heinz Center and Task Group Chair will facilitate email dialogues between meetings, and some or all members will participate in drafting the Task Group's final report.

III. Terminology

The State of the Nation's Ecosystems generally uses the term "non-native," instead of "nonindigenous" or "alien," to refer to species that find themselves in new habitats. We have pointed out in the report that the terminology to describe such species is evolving. The task group will have to navigate within this changing, and at times highly charged, environment.

Executive Order 13112 defines as "alien" any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to a particular ecosystem. It also defines as "invasive" any alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.

Adopting the terminology of the EO 13112 is a non-trivial step because the definitions leave much room for interpretation. For example, defining alien relative to an "ecosystem" begs the question of what delineates an ecosystem, and clearly, such a definition is to some extent dependent on the scale at which an evaluation is made. In addition, such definitions pose significant challenges to those who must operate monitoring programs. Further, defining invasive as a species whose introduction "does or is likely to cause…harm…" imposes a requirement of good predictive capability—which the scientific community does not presently have.

Note that, in some cases, what might have traditionally been thought of—and which large segments or our audience consider as— "native" species have been included in the bundle of "non-native" indicators. This includes species that may be native to North America, but which have shifted their range to included areas in which they have not previously been found. We have also included a category of *disruptive* species— those that have negative effects on natural areas and native species or cause damage to people or property, irrespective of whether they are "native" or "non-native" by other definitions. Whitetail deer on the east coast are a classic case; our Urban/Suburban Work Group felt that a definition that focused on outcomes and effects (i.e., whether the species causes problems or not) was more appropriate than one that focuses on the species origins.

In addition, "noxious weeds" are defined by federal and state agencies as nonindigenous invasive plants. The Animal and Plant Health Inspection Service (APHIS) federal noxious weed program is designed to prevent the introduction into the United States of nonindigenous invasive plants and to prevent the spread of newly introduced invasive plants within the United States. This terminology is acknowledged in the *State of the Nation's Ecosystems*, but it was not incorporated it into any of the indicators.

There is a need for the new task group to articulate these terms and associated issues more clearly as we prepare to draft material for the 2007 volume of this report. Some background on the process of invasions is included in the Appendix to serve as a seed for future discussions.

IV. Major Challenges for the Task Group

The following issues all deal with the perceived need to have more commonality within the suite of non-native indicators, as well as the need to strengthen the conceptual basis of the indicators. These issues will have to be addressed, head on, by the new task group.

Defining the Universe

There are a variety of perspectives that one could take in defining what is non-native and what is not. Spatially, it could be logical to decide that only species originally from areas outside of North America are non-native to the nation's ecosystems. However, it is clear that, in some cases, species whose range becomes broader, or otherwise shifted, should be considered non-native in their new habitat. For example, bull frogs are native to the eastern United States, but are believed to be causing significant ecological damage in western aquatic systems.

Clearly, Executive Order 13112 attempts to combine these aspects together by defining "alien" from the perspective of a given ecosystem, rather than some sort of geopolitical boundary—it does not, however, give explicit instructions for what should constitute an ecosystem beyond "the complex of a community of organisms and its environment."

The Issue of Time

A complication is added when time is entered into the equation: How long—if ever—must a species be in a new habitat before it is considered "native"? That is, should a bird species, such as the starling, that was introduced over 100 years ago, still be considered non-native? Is the arrival of Europeans the appropriate dividing line? The retreat of the last ice sheet? This is certainly a difficult question, and the answer may differ by species or other dimension. Yet, it is just this type of unresolved issue that prevents us from communicating a clear message.

One approach—albeit probably quite difficult to implement in practice, and potentially controversial—might be to consider species "non-native" and to track them as such, until there is a determination that the species is not (or is no longer) significantly invasive; that is, that the species has become a more or less stable element of the North American landscape.

Non-native versus Invasive

Why do we care about non-native species? The primary reason appears to be that they have the potential to become invasive, and thereby displace native species, disrupt ecosystem function, and alter the benefits humans derive from the ecosystem[2]. One could argue—and many do—that society should not be seriously concerned about introduced species that are present in a few small pockets of habitat, but that do not transition from "established" to "invasive."

Thus, there is a powerful logic to the distinction between non-native and invasive species, and several of the indicators make this distinction. However, this distinction is problematic.

Clearly, in hindsight, it is possible to determine which species are invasive, but our ability to predict which species will be invasive, or perhaps to identify those that are invasive at a very early point on the continuum from *introduced* to *established* to *invasive* is quite limited. This seems to be a fundamental obstacle for indicators that are framed in terms of tracking invasive species only. Nonetheless the value to decision makers and opinion leaders of the suite of non-native indicators is reduced if increasing (or decreasing) trends have minimal correlation with the impact that these species have on our nation's ecosystems.

There are practical challenges in designing monitoring systems that distinguish between "all non-natives" and "invasives", and similar problems if one wishes to track species that may be native to North America, but have shifted range. Some species may be invasive in some habitats or ecoregions, and not in others. Some species may be considered native in one state and non-native in another. Implementing broad-scale monitoring programs that are able to maintain and apply these distinctions across many different ecosystem types and for many different species may be quite challenging.

Plants, Animals, or Both?

Some of the indicators in *The State of the Nation's* Ecosystems focus on plants, some on animals, some on both. Clearly, the primary objective is to focus on those taxa posing the greatest threat to native species and ecosystems. In some cases, Work Groups made a judgment that one (usually plants) should be the sole focus, but the task group should examine this judgment.

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[2] In fact, we are similarly concerned about invasive species that happen to be native to an area, but have, for example, been released from predation pressures.

Perhaps it was convenient that none of the indicators that proposed to deal with both plants and animals had adequate data available. It is our belief that it will be a challenge to present data for both plants and animals in a single, easily understood indicator, particularly because of the different metrics proposed for the plant and animal components of the indicators.

Indicators that incorporate animals do so in a variety of manners. One of the factors to be included in the coasts and oceans indicator is the degree to which non-natives occupy available habitat. For animals, this might be measured as the percent of the biomass of all animals sharing the habitat that is attributable to non-native species. The freshwater indicator simply tallies the number of non-native fish in the nation's watersheds, and it is not clear how non-native plants would fit into this framework. The grassland and shrubland birds indicator deals with population trends of invasive species—regardless of whether or not they are technically "non-native."

Serious consideration needs to be given to the structure of indicators that include both plants and animals. While it appears feasible to construct easily-understood indicators that include either plants or animals, it is less clear if it will be possible to do so for an indicator that combines plants and animals.

Coasts and Oceans: Non-native Species
Indicator: Page 76, Technical Note: Page 222

Percentage of major estuaries with high, medium, or low influence by non-native species; "influence" should incorporate both the number of species present, and the degree to which they occupy the available habitat. This indicator is limited in focus to estuarine areas.

The indicator does not attempt to evaluate the significance of non-native species to economic or ecological condition—it simply evaluates the amount of the system that is "occupied" by non-natives. Non-natives include at least: fishes, mollusks, crustaceans, higher aquatic plants, and macroalgae. The term "occupied" is meant to represent somewhat different things for motile versus non-motile organisms. For example, for higher aquatic plants, mollusks, and macroalgae, the actual percentage of the estuary that is covered by these should be reported. However, for motile species such as fish and crabs, it would be difficult to assess the proportion on any one area covered by these species. Instead, it is suggested that the percentage of all biomass (fish or crab, in these cases) be reported. The table below outlines a possible approach for structuring the indicator.

	% of Non-native Species		
% of Area Inhabited or % of Total Biomass	<25	25-75	75-100
<25	1 (low)	2 (low)	3 (medium)
25-75	2 (low)	3 (medium)	4 (high)
75-100	3 (medium)	4 (high)	5 (high)
Possible ranking system: 1,2 = low; 3 = medium; 4,5 = high			

Farmlands: Native Vegetation in Areas Dominated by Croplands
Indicator: Page 104, Technical Note: Page 237

This indicator would report, for areas where croplands account for a large percentage of the land cover, how much of the remaining vegetation (outside of croplands) is native to the area. Note: this is simply an inverse of several of the non-native indicators discussed here in that it reports the fraction that is native rather than the fraction that is non-native.

Clearly, several questions must be answered before this indicator can be implemented. These include the scale at which it should be reported (i.e., county, state, or region?); the threshold for including an area in the indicator (i.e., should the indicator include only areas with more than 50% croplands, or more than 75%?); and the proportion of non-native species that should be used to categorize areas as "dominated" by non-native rather than native species. As noted above, a complete definition of this indicator would require a decision as to whether "non-native" means only species that are not native to North America, or whether species with expanded ranges would be included, and if so, for how long they would be considered "non-native" in their new range.

Forests: Area Covered by Non-native Plants
Indicator: Page 125, Technical Note; Page 251

Percentage of understory and overstory covered by non-native plants.

Data are not currently available for national reporting, but the USDA Forest Service is incorporating such measurements into their Forest Inventory and Analysis (FIA) program. We believe the Forest Service is including all non-native species; that is, we believe they are not making a distinction between non-native and invasive, but we are not certain whether their definition of non-native covers species native to North America that have shifted in range.

Fresh Waters: Non-native Species
Indicator: Page 145, Technical Note; Page 251

Percentage (and number) of watersheds having different numbers of non-native species with established breeding populations.

The Freshwater Work Group recommended that "[I]deally, this indicator would track only invasive species, perhaps by reporting on a selected group of problematic or potentially problematic species, as identified by recognized experts." The Work Group further recognized, however, that "it is not now possible to identify potentially problematic species, and thus we have chosen to report on all non-native species."

The indicator currently has data for fish only. For remaining animals and all plants, USGS's Biological Resources Division's (BRD) Nonindigenous Aquatic Species (NAS) program collects these data and, hopefully, it should just be a matter of time before the data are mature enough for national reporting.

Grasslands and Shrublands: Non-native Plant Cover
Indicator: Page 125, Technical Note; Page 261

Percentage of plant cover that is made up of non-native species.

Invasive non-natives will be reported separately from all non-natives, however, the report recognizes that work needs to be done on defining the difference between "invasives" and other non-native species.

Grassland and Shrublands: Population Trends in Invasive and Non-invasive Grassland/Shrubland Birds.
Indicator: Page 169, Technical Note; Page 262

Comparison of the percent of species with increasing population trends (in five-year intervals) for a group of native, non-invasive bird species and a group of invasive birds species (which includes both non-native and native species). Indicator focuses on Midwestern and Western grasslands and shrublands.

This indicator attempts to capture the degree to which invasive birds are spreading aggressively, by measuring whether they are expanding at a greater rate or in periods when non-invasive birds are declining. The invasive group includes both species that are "Old World natives" such as cattle egrets, gray partridge, European starling, and ring necked pheasant, as well as those that are native to North America but considered problematic, such as American robin, brown headed cowbird, and house finch.

Urban and Suburban Areas: Disruptive Species

The number and type of disruptive species found in metropolitan areas. Disruptive species are those that have negative effects on natural areas and native species or cause damage to people and property. The data would be reported in four categories: native plants, non-native plants, native animals, and non-native animals.

This indicator uses the term *disruptive species* to refer to species with deleterious effects, primarily related to rapid population increase, irrespective of whether they are native or not. The Urban/Suburban Work Group identified significant problems with a metric that focused simply on non-native species—however defined. These included the ubiquitous nature of intentionally introduced non-native plants in developed areas, many of which are both desired by residents and not invasive or otherwise problematic, and the fact that many of the most disruptive species, such as whitetail deer, are native to North America.

APPENDIX: *Background: Immigration, Establishment, and Invasion*

While not "on the radar" twenty years ago, there is heightened concern about non-natives, because people readily transfer them from one location to another by our global transportation network and by deliberate actions (e.g., the desire to incorporate exotics in our landscaping), and because a small percentage of those introduced have seriously altered the ecosystems in which they thrive—they are often, among other terms, called "invasive" species.

As described at length in a recent National Academy study (NRC, 2002), colonization by nonindigenous species can be categorized into three steps: immigration, establishment, and biotic invasion. Immigration does occur naturally for some species (e.g., windborne transport of fungal spores), however, it is thought to be minor compared to the transport that is facilitated by humans—either directly (e.g., introducing fish for sport fishing reasons, or plants for landscaping) or indirectly (the transport of larvae and other organisms in ship ballast water).

To become established, a species need not be abundant or growing rapidly, yet it (or its descendents) must be able to withstand challenges to their survival. That is, they must not succumb to the various causes of extinction at low numbers (e.g., stochastic events, including unfavorable genetic mutations) in their new environment.

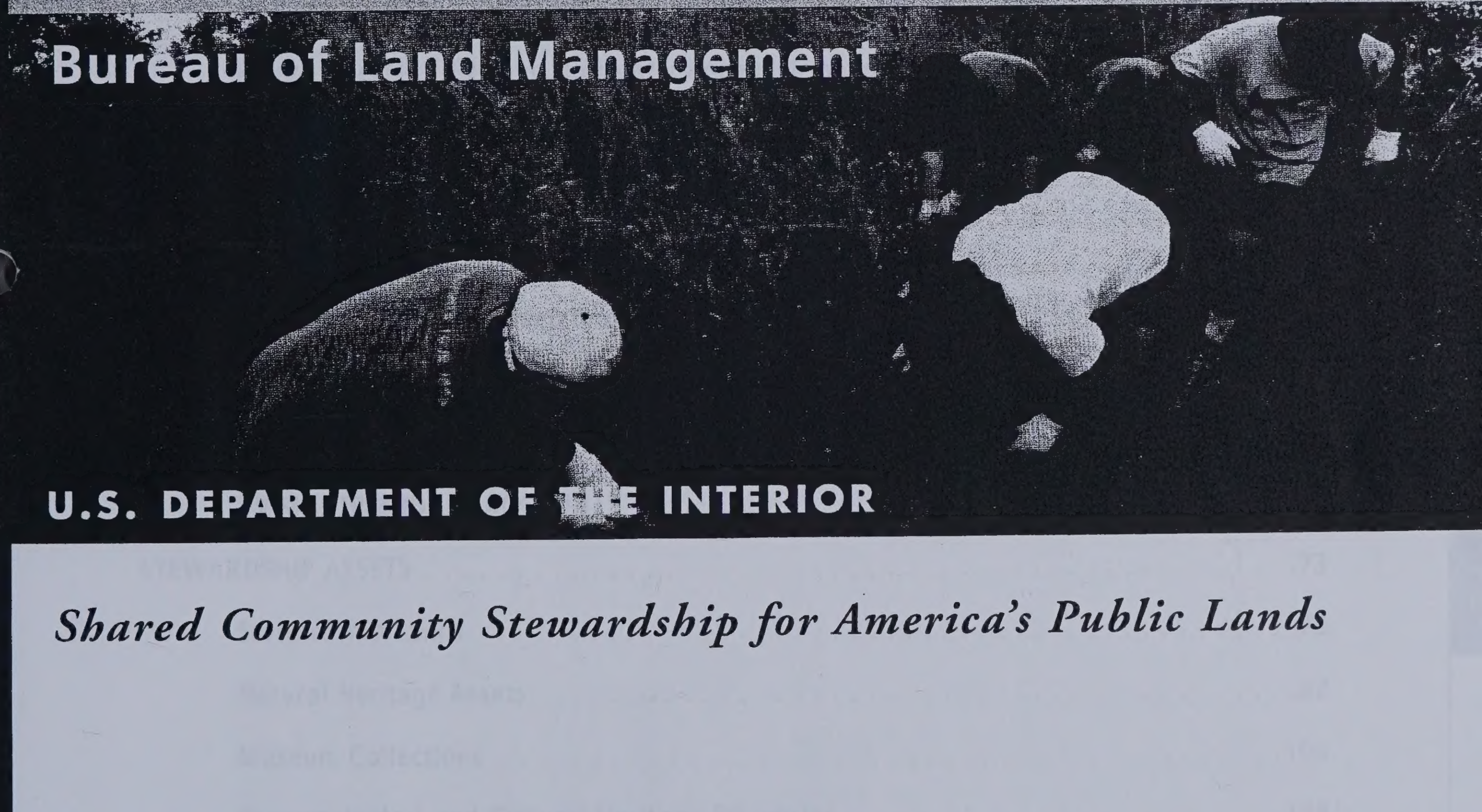
To mount an effective biotic invasion, a species must increase in abundance and spread beyond the original point of introduction. As the species spreads, it must be able to successfully compete for resources so that new populations grow in abundance. Genetic diversity of the invading population may play an important role, although it is not entirely clear what is necessary from an evolutionary standpoint for a species to be a good invader. Soon after introduction, a species must overcome unfavorable mutations and other genetic events that can lead to stochastic extinction. Established species that jump to being invasive do not necessarily need high genetic diversity within the population. However, as multiple populations become established, new genotypes will emerge and some of these will have a better chance of being invaders due to their higher fitness for the new environment.

The dominance of various species that are native to an area tends naturally to vary over time—especially in situations where natural disturbances, such as forest fires, create major changes in habitat. In contrast, invasive species cause concern, because they capitalize on a favorable environment, in turn displacing native species, disrupting ecosystem function, and altering the benefits humans derive from the ecosystem. In general, the advance of an invasive species is not fleeting, but rather a long-term change.

As noted above, native species, in some cases, can also be "invasive" (in the sense of moving into new habitats) and "disruptive" (in the sense of increasing in population to the point of causing ecological and economic damage). If, for example, predatory pressures are relieved, populations of species such as whitetail deer tend to explode unchecked.

Reference:
National Research Council, Committee on the Scientific Basis for Predicting the Invasive Potential of Nonindigenous Plants and Plant Pests in the United States. 2002. Predicting Invasions of Nonindigenous Plants and Plant Pests. Washington, DC. National Academy Press.

Annual Report



Bureau of Land Management

U.S. DEPARTMENT OF THE INTERIOR

Shared Community Stewardship for America's Public Lands

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Stewardship Assets (unaudited - see accompanying independent auditors' report)

The BLM has been entrusted with stewardship responsibility for the multiple-use management of natural resources on almost 262 million acres of public land. The agency also supervises mineral leasing and operations on 700 million acres of mineral estate that underlie BLM and other Federal surface ownerships, as well as private surface ownerships. About 166 million acres of this subsurface mineral estate have been withdrawn from mineral entry, leasing, and sale, except for valid existing rights. Our Nation's public lands are valued for their environmental resources, their recreational and scenic values, the cultural and paleontological resources they contain, their vast open spaces, and the resource commodities and revenue they provide to the Federal government, states, and counties.

BLM-managed land used for field office sites, employee housing, seed orchards, recreation facility sites, and other administrative purposes is not included in the category of stewardship land. Land used for these purposes is considered to be administrative or recreation real property. All other BLM-managed lands are considered to be stewardship lands.

Stewardship Lands

LOCATION OF STEWARDSHIP LANDS

Most of the public lands for which the BLM serves as steward were once a part of the 1.8 billion acres of "public domain" lands acquired by the Nation between 1781 and 1867. Lands managed by the BLM represent about one-eighth of America's land surface, or approximately 42 percent of the lands under Federal ownership. The BLM manages lands in 30 states, but most of the public lands are located in Alaska and the 11 western states, encompassing Arizona, California, Colorado, Idaho, Montana, New Mexico, Nevada, Oregon, Utah, Washington, and Wyoming.

Figure 1 shows the percentage of each state's surface acreage that is managed by the BLM.

USE OF STEWARDSHIP LANDS

The BLM is guided by the principles of multiple use and sustained yield in managing the public lands—principles that are shaped by both tradition and statute. Historically, multiple use has meant that the same area of land can be used simultaneously for two or more purposes, often by two or more different persons or groups. These uses might be complementary, or, as is frequently the case, competitive with one another. This long-term BLM management practice was codified in 1976 with the enactment of the Federal Land Policy and Management Act (FLPMA). Recognizing the value of the remaining public lands to the American people, Congress declared that these lands generally would remain in public ownership and defined multiple use as "management of the public lands and their various resource values so they are utilized in the combination that will best meet the present and future needs of the American people."

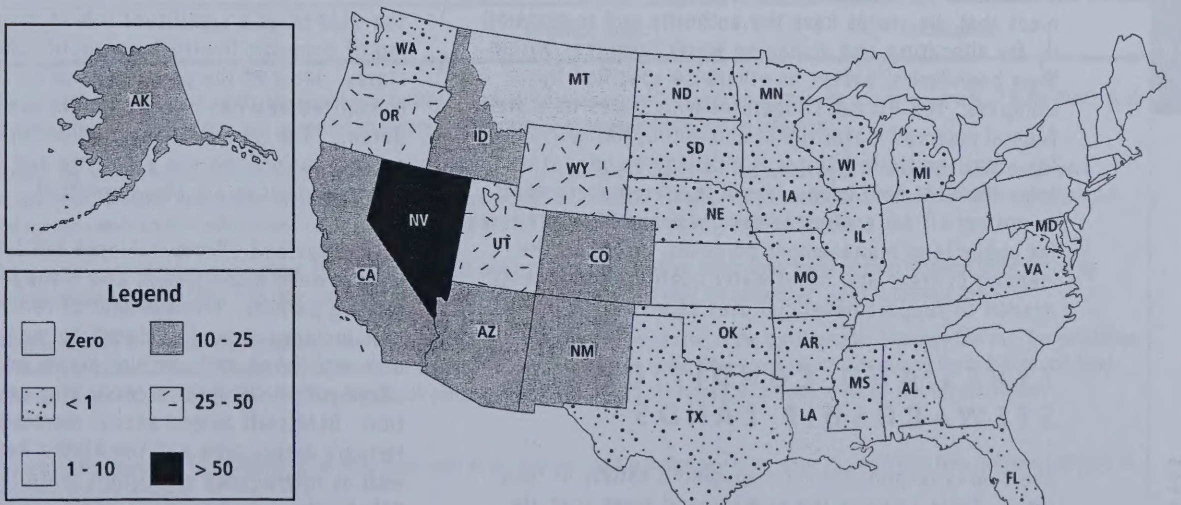


Figure 1 - Percentage of Each State's Surface Acreage Managed by the BLM

FLPMA requires not only that BLM's management of the public lands avoid permanent impairment of the productivity of the land, but also that it not lead to the permanent impairment of "the quality of the environment." The act identifies the uses that are embraced by the multiple use concept to include mineral development; natural, scenic, scientific, and historical values; outdoor recreation; livestock management; timber; watershed; and habitat for wildlife and fish. In managing the public lands for these uses, the BLM is constrained by the legal mandate to "protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values . . . and provide for . . . human occupancy and use."

For the BLM, land use planning is the process by which the multiple use concept is put into practice on any tract of public land. Use of the public lands and the riches they contain has changed throughout our Nation's history and continues to evolve. Identifying the predominant use of BLM-managed lands does not adequately portray the multiple use and sustained yield concept that guides the BLM in accomplishing its basic mission.

In adhering to the concept of multiple use and sustained yield, the Bureau's land management programs include significant efforts in preserving significant cultural and natural features; creating opportunities for commercial activities; protecting endangered species; developing opportunities for recreation and leisure activities; protecting public health, safety, and resources; managing wild horses and burros; managing wildlife habitat and fisheries; administering mining laws; managing rangelands; overseeing forest management, development, and protection; protecting wilderness; restoring riparian areas and wetlands; and managing wild and scenic rivers.

Water plays a critical role in supporting many aspects of public land and resources management. The BLM recognizes that the states have the authority and responsibility for allocating and managing water resources within their boundaries, except as otherwise specified by Congress. The Bureau cooperates with states to protect Federal reserved water rights and appropriative rights for water the United States is entitled to under state law. The BLM also cooperates with state governments to protect all water uses as designated under state law for public land management purposes, including the meeting of state and tribal water quality requirements needed to support beneficial uses of water.

TYPES AND CONDITION OF STEWARDSHIP LANDS

The BLM is responsible for managing a variety of land types. Table 1 shows the primary land types that are managed by the BLM, along with their general condition.

Rangelands: Rangeland is the largest land type managed by the BLM. Rangeland is a type of land on which the native vegetation (climax or natural potential) is predominately grasses, grass-like plants, forbs, or shrubs. Rangeland includes lands revegetated naturally or artificially when routine management of that vegetation is through manipulation of grazing. Rangelands encompass natural grasslands, savannahs, shrublands, most deserts, tundra, alpine communities, marshes, and meadows. The BLM manages rangelands as a natural ecosystem. Table 2 shows the distribution of the 160 million acres of BLM rangeland in the western states.

Rangeland Management: Well-managed rangelands produce forage and habitat for domestic and wild ungulates, neotropical birds, threatened and endangered plant and animal species, other forms of wildlife, and wild horses and burros. As a result of their watershed function of capturing and filtering water, rangelands supply water to communities, municipalities, and agricultural producers, as well as serving as areas for the natural recharge of aquifers from rain and snow. Rangelands also provide open space and room for a growing number of people wanting to hunt, fish, camp, hike, sightsee, operate off-highway vehicles, ride motorcycles, and participate in other forms of outdoor recreation.

The use of rangelands for grazing is supported not only by FLPMA, but also by the Public Rangelands Improvement Act of 1978 (PRIA) and the Taylor Grazing Act of 1934, as amended. The Taylor Grazing Act confers broad powers upon the Department of the Interior for the multiple use management of natural resources. It also contains very direct language requiring the BLM to stop injury to the public grazing lands by preventing overgrazing and soil deterioration; to provide for their orderly use, improvement, and development; and to stabilize the livestock industry that depends upon the public rangelands.

The BLM plays a significant role in managing the grazing of domestic livestock on public lands in the western states. Most of the permitted use on the public lands is committed and has been since the early days of the Bureau. The primary domestic livestock that are issued permits for grazing use are cattle and sheep. Horses, goats, and bison are also permitted.

BLM rangeland efforts in Alaska fall into two categories: weed management and management of reindeer grazing permits. Management of reindeer grazing permits includes annual fieldwork to monitor use and condition of lichen and vascular plants on selected grazing allotments (helicopter access), plus casefile administration. BLM staff attend annual meetings of the Reindeer Herders Association and the Alaska Reindeer Council, as well as interagency workshops featuring topics such as GIS database development, radio collaring techniques, and other areas of interest.

Table 1 - Type and Condition of Lands Managed by the BLM

Land Type	Acres/Miles	Condition [1]
Rangeland		
a. Alaska Rangeland (Reindeer grazing permits: 1.2 million acres)	5 Million Acres	Potential natural community (excellent) ..20% Late seral (good) 80%
b. Continental USA Rangelands [2-3-4]	160 Million Acres	Potential natural community (excellent) ....7% Late seral (good) ....30% Mid seral (fair) ....34% Early seral (poor) ....12% Unclassified [5] 17%
Forested Land		
a. Forestlands	11 Million Acres	9 Million Acres ....Healthy
b. Woodlands	44 Million Acres	14 Million Acres ....Needing Restoration [6] 32 Million Acres ....Unknown
Riparian Areas and Wetlands		
a. Riparian Areas	140,000 Miles 10 Million Acres	Alaska Properly Functioning ....100% Nonfunctional ....Trace Unknown ....Trace Lower 48 States Properly Functioning ....46% Functioning but at Risk ....42% Nonfunctional ....9% Unknown 3%
b. Wetlands	13 Million Acres	Alaska Properly Functioning ....98 % Unknown ....2 % Lower 48 States Properly Functioning ....65% Functioning but at Risk ....19% Nonfunctional ....2% Unknown 14%
Aquatic Areas (Lakes, Reservoirs, and Streams)	3 Million Acres 116,485 Miles	Alaska: Good Lower 48 States: Unknown
Other Habitat	16 million Acres	Unclassified

[1] The cumulative direct impacts of the identified future liability hazardous materials sites will be very small nationally or even regionally. It is the BLM's goal to achieve cleanup of these sites, and as needed, to restore the functions of adversely affected natural resources.

[2] Invasive and noxious weeds currently infest more than 8.5 million acres, or 5 percent of the BLM's 160 million acres of rangeland in the continental United States. The BLM incorporates Integrated Pest Management techniques. The BLM's strategy for preventing and controlling the spread of invasive and noxious weeds on BLM-administered public lands is outlined in the "Partners Against Weeds" (PAW) Action Plan.

[3] This is a composite of rangeland condition classification since 39 percent of the rangelands on public lands have not been classified under the newer ecologically based classification. The older range condition classification as depicted here rates the rangelands' ability to produce forage.

[4] Bureauwide, only 61 percent of rangeland has been inventoried using Ecological Site Inventories or the Soil-Vegetation Inventory Method. The percentage by state is as follows: Arizona, 76 percent; California, 16 percent; Colorado, 58 percent; Idaho, 54 percent; Montana (including North Dakota and South Dakota), 78 percent; Nevada, 54 percent; New Mexico, 80 percent; Oregon (including Washington), 82 percent; Utah, 62 percent; and Wyoming, 56 percent.

[5] The unclassified condition for "Rangeland" refers to lands such as dry lakebeds, rock outcrops, and other areas for which data have not been gathered or estimates are not available.

[6] Experts in the BLM estimate that approximately 14 million acres are in need of ecological restoration work, including mechanical forest thinning/fuel reduction, prescribed fire treatments, and tree species reintroduction.

Table 2 - Rangelands: Distribution by State

State	Rangeland
Arizona	11,834,148
California	7,875,087
Colorado	8,250,173
Idaho	11,695,021
Montana/Dakotas	8,143,453
Nevada	45,715,363
New Mexico/Oklahoma	11,830,471
Oregon/Washington	13,899,495
Utah	22,390,083
Wyoming/Nebraska	17,924,927
Total Acreage	159,558,221

Field office managers and their resource staffs assess rangelands in accordance with each state's Standards for Rangeland Health (43 CFR 4180). These assessments are completed on areas to ensure, at a minimum, that grazing practices incorporate the following principles: (1) maintain or achieve properly functioning ecosystems; (2) achieve properly functioning riparian systems; (3) maintain, restore, or enhance water quality that meets or exceeds state standards; and (4) maintain or restore the habitat of threatened or endangered and category 1 or 2 candidate species. Each state has developed its own standards for rangeland health with the help of Resource Advisory Councils. These councils are composed of individuals representing commodity interests, conservation groups, elected officials, state government agencies, Indian tribes, and academic institutions.

View of a forested area in Oregon's Medford District.

In FY 2003, field offices completed rangeland health evaluations on 1,393 grazing allotments encompassing about 10.5 million acres. To date, 8,753 allotments have been reviewed encompassing 68,942,754 acres.

Another ongoing effort for BLM is the renewal of expiring term grazing permits and leases. This effort requires a review of each permit and lease to ensure conformance with land use plans and compliance with the National Environmental Policy Act (NEPA).

Rangeland Condition: The condition of rangeland managed by the BLM is expressed as the degree of similarity of present vegetation to the potential natural plant community:

- "Potential natural community" means current vegetation is between 76 and 100 percent similar to the potential natural plant community.
- "Late seral" means current vegetation is between 51 and 75 percent similar to the potential natural plant community.
- "Mid seral" means current vegetation is between 26 and 50 percent similar to the potential natural plant community.
- "Early seral" means current vegetation is between zero and 25 percent similar to the potential natural plant community.

Forests and Woodlands: Approximately one-fifth of the land under BLM jurisdiction, or 55 million acres, is forest and woodland. Forests and woodlands that are managed by the BLM include black and white spruce in Alaska; aspen, lodgepole pine, ponderosa pine, interior Douglas fir, and associated species of the Intermountain West; the pinyon-juniper woodlands of the Great Basin and the Southwest; and the Douglas fir, hemlock, and cedar forests of western Oregon and northern California.

Forests are generally defined as lands with 10 percent or greater stocking in tree species typically used in commercially processed wood products (lumber, plywood, paper, etc.). Woodlands are defined as those lands with 10 percent or greater stocking in tree species not typically used in commercial wood products, such as pinyon pine, juniper, cottonwood, and black spruce.

Table 3 shows the distribution of the 55 million acres of forests and woodlands by state.

Table 3 - Forests and Woodlands: Distribution by State

State	Forests (thousand acres)	Woodlands (thousand acres)	Total (thousand acres)
Alaska	5,297	22,982	28,279
Arizona	20	1,054	1,074
California	204	2,004	2,208
Colorado	1,069	3,041	4,110
Idaho	512	380	892
Montana	783	27	810
Nevada	5	6,269	6,274
New Mexico	44	941	985
Oregon	2,410	931	3341
Utah	338	5,735	6,073
Washington	36	14	50
Wyoming	474	530	1,004
Total Acreage	11,192	43,908	55,100

Forest and Woodland Management: All BLM forests and woodlands are managed under the principles of multiple use, sustained yield, and protection of environmental quality in accordance with the Federal Land Policy and Management Act (FLPMA). Management of values and uses such as recreation, aesthetics, water quality, wildlife habitat, and wilderness, as well as timber and other forest biomass production, is accomplished through an ecologically based program that emphasizes biological diversity, sustainability, and the long-term health of forests and woodlands.

Of the just over 11 million acres of forests managed by the BLM, approximately 5 million acres are located in the interior of Alaska. Timber development in this region is usually uneconomical due to the lack of transportation systems, and has also been largely deferred until State selection, Native claims, withdrawals, and other dispositions are completed.

The most productive forests managed by the BLM are located in western Oregon on what are referred to as the O&C lands. These lands were deeded back to the Federal government following the demise of the Oregon and California Railroad and the Coos Bay Wagon Roads (CBWR) in the 1930s. These highly productive lands are managed under the Northwest Forest Plan to provide a sustainable supply of both timber and non-timber resources. Of the approximately 2.3 million acres of commercial forest in western Oregon, about 496,000 acres are available to be intensively managed for timber production and produce about 84 percent of the total volume of timber annually harvested from BLM forests.

Forest and Woodland Condition: In the past few years, the traditional emphasis of forest management has changed. Attention is now focused on the ecological condition of forests and woodlands, expressed in terms of forest health. Forest health is characterized by such factors as age, structure, composition, function, vigor, the presence of unusual levels of insects or disease, and resilience to disturbance from factors such as wildfire. Overall forest health on BLM forests declined over the past century due primarily to the exclusion of frequent, low-intensity fires. Exclusion of natural fires in forest ecosystems has led to tree population explosions, dead fuel accumulation, and landscape-level species composition changes that now seriously threaten the health of public forests. One consequence has been extensive insect and disease epidemics. Another consequence has been large, catastrophic wildfires that far exceed historic fire severity. Congress recognized this impending disaster after the 2000 fire season and has dramatically increased funding under the National Fire Plan to begin to address the problem. The BLM is responding as part of the President's Healthy Forest Initiatives by developing projects to reduce hazardous fuels and utilize small-diameter trees for a variety of forest products, such as posts, poles, fuelwood, and biomass for energy production in support of the National Energy Policy.

The BLM estimates that more than one-fourth of the forests and woodlands it manages, or approximately 14 million acres, are in need of ecological restoration work, including mechanical thinning, hazardous fuel reduction, and tree species reintroduction.

The Forest Vegetation Information System (FORVIS), a forest and woodland inventory and analysis tool, was released for field use in 2002. The system provides data management and analytical capabilities for inventorying and monitoring vegetation on forested uplands. FORVIS provides a data repository and spatial analysis tools for assessing condition on forests and woodlands.

Riparian Areas and Wetlands: Riparian areas are linear "riverine wetlands" adjacent to flowing or standing bodies of water where vegetation is strongly influenced by the presence of water. This definition excludes ephemeral stream reaches where water flows for only brief periods during storm runoff events. Riparian areas may constitute less than 1 percent of the land area in the western part of the United States, but they are among the most productive and valuable of all lands.

Early attempts to track the condition of these natural linear features using an area unit (acres) rather than a linear unit (miles) proved difficult because the width, or distance from the stream, is difficult to estimate and would require costly field investigation. Remotely sensed estimates using aircraft or satellite images would be highly inaccurate and variable because of normal climatic variation. In light of this, the BLM has improved its linear estimates while conducting assessments of riparian condition status, but has discontinued its efforts to measure riparian acreage. The 10 million acres reported in Table 1 is a broad estimate of the total riparian acreage, but this figure lacks precision for the reasons noted above. Table 4 shows the distribution of both riparian areas and wetlands by state.

On the BLM public lands with a subhumid climate in western Oregon, northern California, northern Idaho, central Colorado, and high elevation areas of Montana, Wyoming, and Utah, riparian areas are characterized by a zone of deciduous trees and shrubs between the streams and conifer forests. In Alaska, riparian areas are composed of willows, alders, and meadow grasses along rivers, lakes, and bogs. In the arid climate of the Great Basin and Southwest, riparian areas are gems in the desert, characterized by grasses, forbs, sedges, woody shrubs, and trees; these areas are easily distinguished from drier upland vegetation.

Table 4 - Riparian Areas and Wetlands: Distribution by State

State	Riparian Miles	Wetland Acreage
Alaska	107,565	12,552,298
Arizona	895	21,899
California	2,615	15,564
Colorado	4,426	9,478
Eastern States	5	119
Idaho	3,906	3,511
Montana	3,878	11,889
Nevada	2,614	18,565
New Mexico	459	3,674
Oregon	4,188	147,703
Utah	5,067	17,711
Wyoming	4,478	14,816
Totals	140,096	12,817,227

Wetlands are generally defined as areas inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support vegetation that is typically adapted for life in saturated soil. Wetlands include bogs, marshes, shallows, muskegs, wet meadows, and estuaries.

Healthy riparian-wetland systems purify water as it moves through the vegetation by removing sediment, and act like a sponge by retaining water in streambanks and ground water aquifers. Riparian-wetland vegetation along upper watershed streams can absorb and dissipate the energy of floodwaters before they reach high-value agricultural lands in lower valleys.

Riparian and Wetland Management: The BLM has placed special emphasis on the inventory, assessment, and management of riparian and wetland areas through its Riparian-Wetland Initiative. This initiative, which provides the blueprint for managing and restoring riparian-wetland areas, encompasses about 13 million acres of wetlands and about 140,000 miles of riparian areas on BLM's public lands. Overall, riparian-wetland areas account for about 9 percent of the almost 262 million acres of land under BLM management.

Many wildlife species depend upon the unique and diverse habitat niches offered by riparian-wetland areas. These habitats provide food, water, shade, and cover; they are valuable sources of forage for big game and livestock.

Riparian-wetland areas provide habitat for more than 42 percent of all the mammals in North America. They are also stopover areas for thousands of migrating birds. Riparian-wetland vegetation is of critical importance for fish, especially for trout in desert streams, where the vegetation provides escape cover. Riparian vegetation also lowers summer water temperatures through shading and reduces streambank erosion that can silt in spawning and rearing areas.

Finally, riparian areas are focal points for recreation, including fishing, camping, boating, and hiking.

Riparian and Wetland Condition: The condition of riparian-wetland areas is determined by the interaction of geology, hydrology, soil, water, and vegetation:

- "Proper functioning" means that adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high waterflows; to filter sediment, capture bedload, and aid floodplain development; to improve floodwater retention and groundwater recharge; to develop root masses that stabilize streambanks against cutting action; to develop diverse ponding and channel characteristics; and to support greater biodiversity..
- "Functioning at risk" means that areas are in functional condition but are susceptible to degradation due to soil, water, or vegetation characteristics.
- "Nonfunctional" means that areas do not provide adequate vegetation, landform, or large woody debris to dissipate stream energy, and consequently do not reduce erosion or improve water quality.
- "Unknown" applies to areas where sufficient information has not been collected to determine condition.

Aquatic Areas: Aquatic areas encompass both flowing and standing bodies of water. These areas encompass almost 2.9 million acres of lakes and reservoirs and more than 116,000 miles of fishable streams on BLM-administered lands. Table 5 shows the distribution of lakes and reservoirs in acres and fishable streams in miles by state.

These areas contain a wide variety of aquatic species, from rare, highly localized endemic native species such as desert pupfish, to broad-ranging endangered and threatened anadromous species such as steelhead and chinook salmon. These species and their aquatic environments depend on sound BLM land stewardship (protection and management) of all BLM land types (forests and woodlands, rangelands, and riparian-wetland areas) on a landscape or watershed basis, in cooperation with other management jurisdictions, state and Federal agencies, and interest groups.

Table 5 - Lakes, Reservoirs, and Fishable Streams: Distribution by State

State	Lake Acreage	Reservoir Acreage	Fishable Stream Miles
Alaska	2,600,000	0	96,424
Arizona	1,164	10,160	160
California	129	65	1,071
Colorado	561	18,149	2,934
Idaho	687	36,924	3,350
Montana	3,500	34,000	1,234
Nevada	24,570	11,300	2,381
New Mexico	21	1,131	278
Oregon	59,375	14,146	3,534
Utah	2,906	24,828	2,644
Wyoming	3,573	33,181	2,475
Totals	2,696,486	183,884	116,485

The landscape/watershed approach is a tool for moving in an orderly fashion towards Clean Water goals. This is required pursuant to the Unified Federal Policy for a Watershed Approach, which was published in October 2000 by the Departments of the Interior and Agriculture, as well as other Federal departments and agencies having responsibilities for Federal land and resource management.

Aquatic Area Management: Many BLM activities directly or indirectly affect, or are affected by, the management of aquatic resources. In addition to resident and anadromous fisheries management, threatened/endangered species and Clean Water initiatives, and Fish and Wildlife 2000, the BLM has implemented standards for rangeland health and guidelines for watersheds, riparian areas/wetlands, stream channels, and water quality. These activities, along with forestry initiatives, contribute to the maintenance and restoration of aquatic habitats. Listings of fish and other aquatic species continue under the Endangered Species Act, while listings of impaired waters are being made by states under the Clean Water Act. Both will require the BLM to modify resource management consistent with species, aquatic ecosystem, water quality, and water use needs.

The Fishery Resources Conservation Plan, developed in response to Executive Order 12962, requires the BLM to enhance recreational angling on public lands; the BLM has provided additional access for fishing opportunities under this plan. One of the Bureau's major goals is to restore native fish species through "Bring Back the Natives," its flagship partnership with Trout Unlimited, the National Fish and Wildlife Foundation, and other Federal and tribal partners. The BLM also has partnerships through locally led watershed coalitions with numerous Federal and state agencies, tribes, local governments, private partners, and non-governmental organizations throughout the West to restore and manage watersheds, including their aquatic systems and ability to produce clean water. With continued involvement in these partnerships, aquatic habitats on BLM-administered lands should continue to improve over the next decade.

With its tree-covered banks, blue waters, and abundant "Blue Ribbon" trout, the Lower Blackfoot offers some of the best floating and fishing in Montana.

Aquatic Area Condition: The BLM has not assessed the condition of all of the aquatic habitats that it manages, nor has any agency developed adequate surface water or ground water data associated with most aquatic habitat. Aquatic condition is highly variable on BLM-managed public lands.

The condition of the more than 96,000 miles of perennial streams in Alaska is good; of the 15,145 miles of BLM-administered streams in Alaska occupied by anadromous fish species, only about 2 percent have been impacted by mining activities, roads, and oil and gas development. The remaining stream miles in Alaska have experienced little or no human impact and are generally considered to be in good to excellent condition. Most water quality permitting on public lands in Alaska is done with close cooperation between the BLM, the U.S. Fish and Wildlife Service, and the Army Corps of Engineers.

Alaska BLM is collaborating with twelve Federal and state agencies to develop remotely based resource information (digital formats for watersheds and their subdivisions) and user tools, which together will enhance our ability to manage and protect aquatic areas. In addition, to respond to diminishing salmon habitats and populations in the Yukon Basin, the BLM is cooperating with Native groups, state agencies, and other Federal agencies to complete habitat restoration and increase salmon populations.

In the 11 western states where the BLM manages large tracts of public land, the condition of those aquatic areas that have been assessed ranges from good to excellent, including the 1,110 miles of rivers designated as Wild and Scenic in these states. However, conditions are degraded or poor in many areas that have been impacted by activities such as historic livestock management practices, water diversion, ground-water pumping, legacy mining, timber harvesting, and road building. For the 3,676 miles of BLM-administered streams in Oregon, Washington, Idaho, and California that support salmon and trout, habitat conditions range from poor to excellent.

A similar range of conditions in aquatic areas prevails in the other western states. Aggressive restoration treatments, including changes in management practices and direct channel/riparian manipulation, will be needed to move Functioning at Risk systems into a Proper Functioning condition.

Other Habitat: Lands classified as other habitat are areas that generally do not provide forage in sufficient amounts to sustain wildlife or grazing animals. This land type includes mountaintops, glaciers, barren mountains, sand dunes, playas, hot-dry deserts, and other similar areas.

NET CHANGE IN STEWARDSHIP LAND ACREAGE FROM 2002 TO 2003

Table 6 below shows the acreage under the exclusive management of the BLM for 2002 and 2003, as well as changes between the two years, by state. The increase of 493,053 acres during 2003 represents an increase of about .19 percent, which resulted from the net effect of acquisitions (purchases), disposals (sales), exchanges (both transfers in and out, frequently together with an equalization payment by one of the parties), withdrawals, restoration transactions, and audits/reviews (corrections) of records. The large increase in Arizona is primarily a result of acres added based upon new Geographic Information System (GIS) data; the increase in California is a result of lands acquired under various public land laws; and the increase in Idaho is largely a result of withdrawn lands restored to the BLM's management jurisdiction. The large decrease in Alaska is a result of acres patented out under various public land laws.

Table 6 - Acreage under the Exclusive Management of the BLM in 2002 and 2003

State	2002 Acreage	2003 Increase	2003 Decrease	2003 Net Change	2003 Acreage
Alabama	111,369	0	0	0	111,369
Alaska	85,953,625	0	301,462	-301,462	85,652,163
Arizona	11,651,958	592,534	16,094	+576,440	12,228,398
Arkansas	295,185	0	0	0	295,185
California	15,128,485	71,612	1,427	+70,185	15,198,670
Colorado	8,373,504	1,626	7,024	-5,398	8,368,106
Florida	26,899	0	0	0	26,899
Idaho	11,846,931	155,151	8,583	+146,568	11,993,499
Illinois	224	0	0	0	224
Iowa	378	0	0	0	378
Louisiana	321,734	0	0	0	321,734
Maryland	548	0	0	0	548
Michigan	74,807	0	0	0	74,807
Minnesota	146,658	0	0	0	146,658
Mississippi	56,212	0	0	0	56,212
Missouri	2,094	0	0	0	2,094
Montana	7,964,623	0	595	-595	7,964,028
Nebraska	6,354	0	0	0	6,354
Nevada	47,874,294	1,481	15,019	-13,538	47,860,756
New Mexico	13,362,538	9,723	830	+8,893	13,371,431
North Dakota	59,642	0	160	-160	59,482
Oklahoma	2,136	0	0	0	2,136
Oregon	16,125,145	12,840	2,079	+10,761	16,135,906
South Dakota	274,960	0	510	-510	274,450
Texas	11,833	0	0	0	11,833
Utah	22,867,896	1,410	1,644	-234	22,867,662
Virginia	805	0	0	0	805
Washington	402,355	961	0	+961	403,316
Wisconsin	159,982	0	0	0	159,982
Wyoming	18,354,151	2,391	1,249	+1,142	18,355,293
Total	261,457,325	849,729	356,676	+493,053	261,950,378

Natural Heritage Assets

PROTECTING AND ENHANCING THE NATURAL AND HUMAN ENVIRONMENT

Guided by the principles of multiple use and sustained yield in managing the public lands, the BLM has recognized the need to protect and enhance the natural and human environment. Special management areas have been designated by presidential, congressional, and administrative action. Presidential action has established most of the BLM's national monuments.

Congress has established one BLM national monument, as well as national conservation and protection areas, wilderness areas, wild and scenic rivers, national trails, and other designations. Administratively designated areas include recreation areas, primitive areas, natural areas, resource conservation areas, areas of critical environmental concern, and others.

TYPES OF SPECIAL MANAGEMENT AREAS

Although the BLM manages natural heritage assets that are not specifically in designated areas, significant portions of the public lands have been congressionally or administratively designated as special management areas. These special management areas have been designated to preserve their natural heritage values. Table 7 provides a summary of designated special management areas, along with their number and size. In general, the ecological

Table 7 - Designated Special Management Areas

Special Management Type [1]	Number	Total Acres [2]	Total Miles [2]
National Landscape Conservation System Areas			
National Monuments [p - 14 and c - 1]	15	4,806,947	
National Conservation and Protection Areas [c]	13	13,976,146	
Cooperative Management and Protection Area [c]	1	425,550	
White Mountains National Recreation Area [c]	1	998,772	
Yaquina Head National Outstanding Natural Area [c]	1	100	
Wilderness Areas [c]	161	6,515,287	
Wilderness Study Areas [a]	604	15,566,656	
National Wild and Scenic Rivers [c]	38	1,005,652	2,061
Headwaters Forest Reserve [c]	1	7,400	
National Historic Trails [c]	10		4,563
National Scenic Trails [c]	2		640
Other Special Management Areas			
National Recreation Trails [a]	29		441
National Back Country Byways [a] [3]	56		3,028
Santa Rosa Mountains National Scenic Area [a]	1	101,000 [4]	
Lake Todatonten Special Management Area [c]	1	37,579	
Herd Management Areas [a]	206	29,649,100	
Areas of Critical Environmental Concern [a]	907	12,939,368	
National Natural Landmarks [a]	45	417,429	
Research Natural Areas [a]	184	426,566	
Globally Important Bird Areas [a]	2	56,500 [5]	

[1] Congressional designations are identified by [c], Presidential proclamation designations are identified by [p], and Administrative designations are identified by [a].

[2] These quantities are also reported in the Stewardship Lands section of this report under the land type (e.g., rangelands, aquatic areas, etc.) applicable to the special management area.

[3] This Special Management Area includes those byways administratively designated under the BLM's Back Country Byway Program. In addition, the BLM is involved in the cooperative management of an additional 17 byways, totaling 2,492 miles, on public lands that have been recognized by state or national designation.

[4] The acreage for the Santa Rosa Mountains National Scenic Area is also contained in the Santa Rosa/San Jacinto Mountains National Monument.

[5] The acreage for Globally Important Bird Areas is also contained in national conservation areas and the Yaquina Head Outstanding Natural Area.

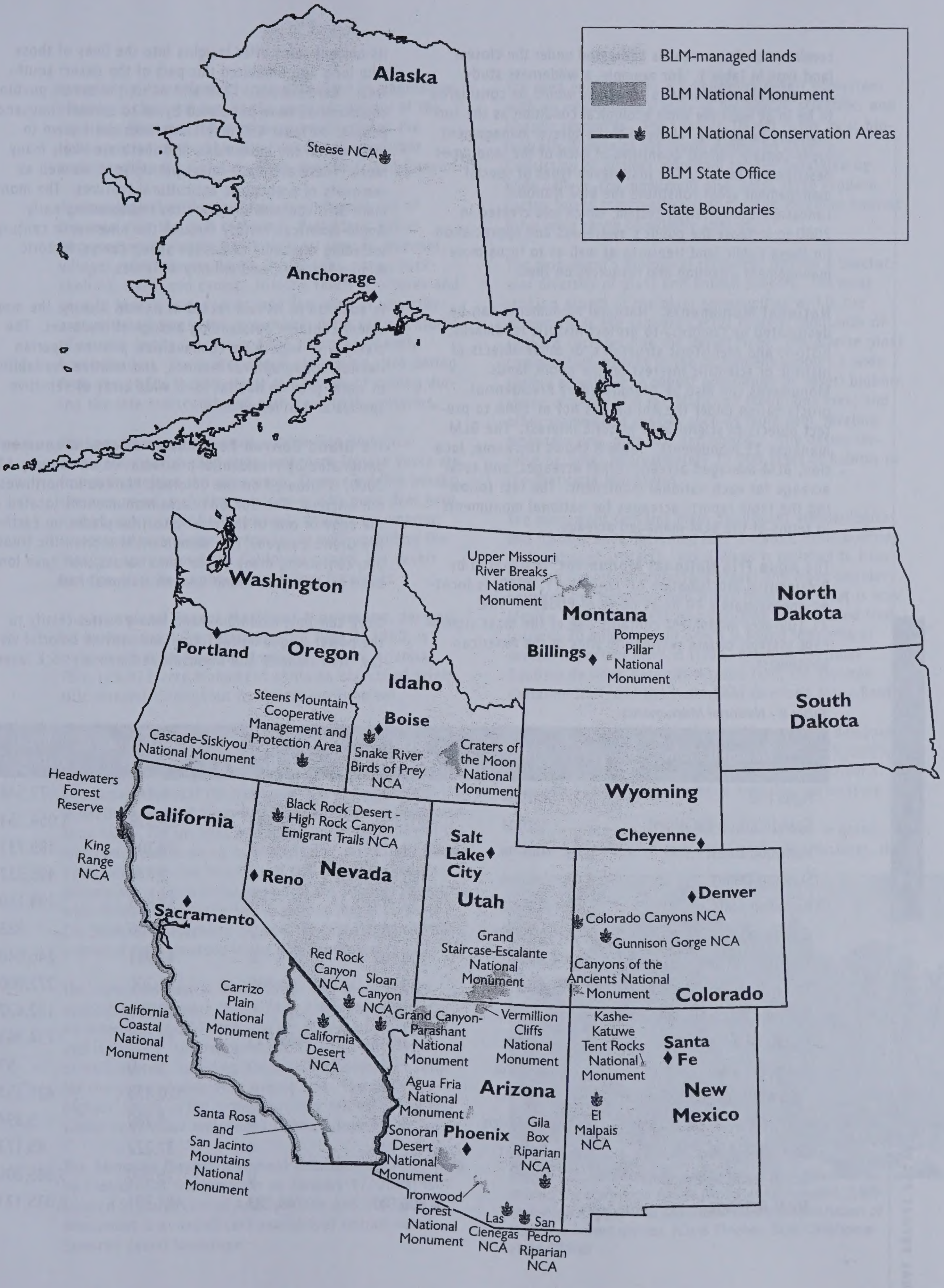

BLM-managed lands
BLM National Monument
BLM National Conservation Areas
BLM State Office
State Boundaries
Alaska
Steese NCA
Anchorage
Washington
Portland
Oregon
Idaho
Boise
Montana
Upper Missouri River Breaks National Monument
Billings
Pompeys Pillar National Monument
North Dakota
South Dakota
Wyoming
Cheyenne
Steens Mountain Cooperative Management and Protection Area
Cascade-Siskiyou National Monument
Snake River Birds of Prey NCA
Craters of the Moon National Monument
Headwaters Forest Reserve
California
King Range NCA
Black Rock Desert - High Rock Canyon Emigrant Trails NCA
Reno
Nevada
Salt Lake City
Utah
Denver
Colorado Canyons NCA
Gunnison Gorge NCA
Canyons of the Ancients National Monument
Colorado
Sacramento
Grand Staircase-Escalante National Monument
Red Rock Canyon NCA
Sloan Canyon NCA
Carrizo Plain National Monument
California Coastal National Monument
California Desert NCA
Grand Canyon-Parashant National Monument
Vermillion Cliffs National Monument
Kashe-Katuwe Tent Rocks National Monument
Santa Fe
New Mexico
Agua Fria National Monument
Arizona
Santa Rosa and San Jacinto Mountains National Monument
Sonoran Desert National Monument
Phoenix
Gila Box Riparian NCA
El Malpais NCA
Ironwood Forest National Monument
Las Cienegas NCA
San Pedro Riparian NCA

Figure 2 - BLM-Managed Public Lands, including National Monuments and National Conservation Areas

condition of these areas is addressed under the closest land type in Table 1. For example, a wilderness study area that is predominantly rangeland would be considered to be in at least the same ecological condition as the surrounding rangeland. Many of these special management areas contain various quantities of each of the land types described in Table 1. The first eleven types of special management areas constitute the BLM National Landscape Conservation System, which was created in 2000 to increase the public's awareness and appreciation for these public land treasures as well as to focus more management attention and resources on them.

National Monuments: National monuments can be designated by Congress to protect historic landmarks, historic and prehistoric structures, or other objects of historic or scientific interest on the public lands. Monuments can also be designated by Presidential proclamation under the Antiquities Act of 1906 to protect objects of scientific or historic interest. The BLM manages 15 monuments. Table 8 shows the name, location, BLM-managed acreage, other acreages, and total acreage for each national monument. The text following the table reports acreages for national monuments in terms of the BLM-managed acreage.

The **Agua Fria National Monument**, designated by Presidential proclamation on January 11, 2000, is located approximately 40 miles north of Phoenix. The 71,100-acre monument contains one of the most significant systems of late prehistoric sites in the American Southwest. Its ancient ruins offer insights into the lives of those who long ago inhabited this part of the desert southwest. Between A.D. 1250 and 1450, the area's pueblo communities were populated by up to several thousand people. At least 450 prehistoric sites are known to exist within the monument, and there are likely many more. There are many intact petroglyphs, as well as remnants of prehistoric agricultural features. The monument also contains historic sites representing early Anglo-American history through the nineteenth century, including remnants of Basque sheep camps, historic mining features, and military activities.

In addition to its rich record of human history, the monument contains outstanding biological resources. The diversity of vegetative communities, pristine riparian habitat, topographical features, and relative availability of water provide habitat for a wide array of sensitive species and other wildlife.

The **Grand Canyon-Parashant National Monument**, designated by Presidential proclamation on January 11, 2000, is situated on the Colorado Plateau in northwestern Arizona. The 807,881- acre monument is located on the edge of one of the most beautiful places on Earth—the Grand Canyon. This monument is a scientific treasure, containing many of the same values that have long been protected in Grand Canyon National Park.

Deep canyons, mountains, and lonely buttes testify to the power of geological forces and provide colorful vistas. Its Paleozoic and Mesozoic sedimentary rock layers

Table 8 - National Monuments

National Monument	State	BLM Acreage	Other Federal Acreage	Non-Federal Acreage	Total Acreage
Agua Fria	Arizona	71,100	0	1,444	72,544
Grand Canyon-Parashant	Arizona	807,881	216,544	29,839	1,054,264
Ironwood Forest	Arizona	129,022	0	60,709	189,731
Sonoran Desert	Arizona	486,603	0	9,734	496,337
Vermilion Cliffs	Arizona	280,324	0	13,836	294,160
California Coastal	California	883	0	0	883
Carrizo Plain	California	204,107	0	41,941	246,048
Santa Rosa/San Jacinto Mountains	California	86,400	64,400	121,200	272,000
Canyons of the Ancients	Colorado	163,892	0	18,530	182,422
Craters of the Moon	Idaho	273,847	465,835	15,181	754,863
Pompeys Pillar	Montana	51	0	0	51
Upper Missouri River Breaks	Montana	374,976	0	120,475	495,451
Kasha-Katuwe Tent Rocks	New Mexico	4,114	0	1,280	5,394
Cascade-Siskiyou	Oregon	52,947	4	32,222	85,173
Grand Staircase-Escalante	Utah	1,870,800	0	15,000	1,885,800
Total Acreage		4,806,947	746,783	481,391	6,035,121

are relatively undeformed and unobscured by vegetation, offering a clear window on the geologic history of the Colorado Plateau. The monument encompasses the lower portion of the Shivwits Plateau, an important watershed for the Colorado River and the Grand Canyon.

Archaeological evidence shows much human use of the area over the past centuries. Prehistoric use is documented by irreplaceable rock art images, quarries, villages, watchtowers, farms, burial sites, caves, rock-shelters, trails, and camps. Historic ranch structures and corrals, fences, water tanks, and the ruins of sawmills are scattered across the monument; these tell the stories of remote family ranches and the lifestyles of early homesteaders. There are several old mining sites dating from the 1870s that illustrate the history of mining during the late nineteenth and early twentieth centuries.

The monument also contains outstanding biological resources. Undisturbed strands of giant Mojave yucca are found throughout the monument. Diverse wildlife inhabit the monument, including a trophy-quality mule deer herd, Kaibab squirrels, and wild turkeys. There are numerous threatened or endangered species as well, including the Mexican spotted owl, the California condor, the desert tortoise, and the southwestern willow flycatcher.

The **Ironwood Forest National Monument**, designated by Presidential proclamation on June 9, 2000, is located 25 miles west-northwest of Tucson, Arizona. This 129,022-acre monument contains objects of scientific interest throughout its desert environment.

The landscape of the Ironwood National Monument is blanketed with the rich, drought-adapted vegetation of the Sonoran Desert. Stands of ironwood, blue palo verde, and saguaro blanket the monument's lower elevations beneath the rugged Silver Bell, Ragged Top, and Waterman Mountains. The geologic and topographic variability of the monument contribute to its biological diversity. Ironwood trees, which can live in excess of 800 years, are the primary nurse plant in this region of the Sonoran Desert, with dominant influence on the surrounding ecosystem. The Silver Bell Mountains support the highest density of ironwood trees recorded in the Sonoran Desert.

The ironwood habitat in the Silver Bell Mountains is associated with more than 674 species, including 64 mammals and 57 bird species. These numbers include several species federally listed as threatened or endangered, including historic and potential habitat for the cactus ferruginous pygmy owl. The desert bighorn sheep in the monument may represent the last viable population indigenous to the Tucson basin.

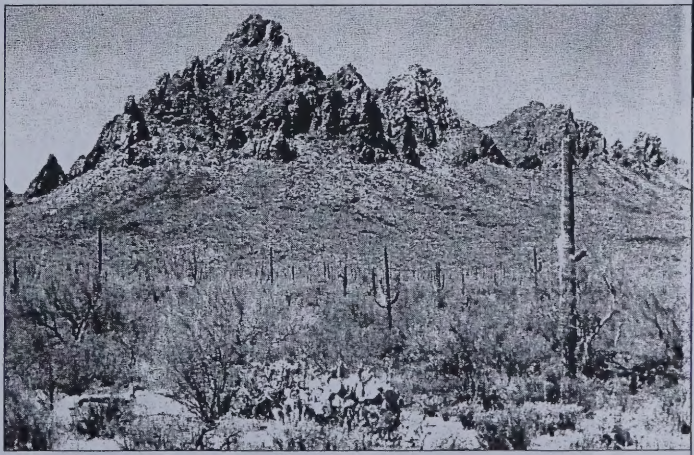
The **Sonoran Desert National Monument**, designated by Presidential proclamation on Janaury 17, 2001, is located in south-central Arizona. The 486,603-acre monument is a magnificent example of untrammeled Sonoran desert landscape. The area encompasses a functioning desert ecosystem with an extraordinary array of biological, scientific, and historic resources. The Sonoran Desert is the most biologically diverse of the North American deserts. Consisting of distinct mountain ranges separated by wide valleys, the monument also holds large saguaro cactus forest communities that provide excellent habitat for a wide range of wildlife species.

The monument's biological resources include a spectacular diversity of plant and animal species. The most striking aspect of the plant communities within the monument is the saguaro cactus forests; thousands of saguaro cactuses line the desert floor. The diverse plant communities present in the monument support a wide variety of wildlife; a robust population of desert bighorn sheep, especially in the Maricopa Mountains area; and other mammalian species such as mule deer, javelina, mountain lion, gray fox, and bobcat. The desert tortoise occupies approximately 25,000 acres of habitat in the Maricopa Mountains.

The monument contains many significant archaeological and historic sites, including rock art sites, lithic quarries, and scattered artifacts. Vekol Wash is believed to have been an important prehistoric travel and trade corridor between the Hohokam and tribes located in what is now Mexico. The monument also contains a much-used trail corridor 20 miles long in which is found remnants of several important historic trails, including the Juan Bautista de Anza National Historic Trail, the Mormon Battalion Trail, and the Butterfield Overland Stage Route.

The **Vermilion Cliffs National Monument**, designated by Presidential proclamation on November 9, 2000, is located west of Page, Arizona, in northern Arizona. This 280,324-acre monument is a geological treasure.

Its centerpiece is the majestic Paria Plateau, a grand terrace lying between two great geologic structures, the



Within the Ironwood Forest National Monument, 3,907-foot-high Ragged Top Mountain harbors a profusion of Sonoran Desert species. (Chris Tincher, BLM Oklahoma Field Office)

East Kaibab and the Echo Cliffs monoclines. The Vermilion Cliffs, which lie along the southern edge of the Paria Plateau, rise 3,000 feet in a spectacular escarpment capped with sandstone underlain by multicolored, actively eroding, dissected layers of shale and sandstone. The stunning Paria River Canyon winds along the east side of the plateau to the Colorado River. Erosion of the sedimentary rocks in this 2,500 foot deep canyon has produced a variety of geologic objects and associated landscape features such as amphitheaters, arches, and massive sandstone walls. In the northwest portion of the monument lies Coyote Buttes, a geologically spectacular area where crossbeds of the Navajo Sandstone exhibit colorful banding in surreal hues of yellow, orange, pink, and red caused by the precipitation of manganese, iron, and other oxides. Thin veins or fins of calcite cut across the sandstone adding another dimension to the landscape.

Some of the earliest rock art in the Southwest occurs in the monument. High densities of Ancestral Puebloan sites occur, including remnants of large and small villages, some with intact standing walls, fieldhouses, trails, granaries, burials, and camps. The monument was also a crossroad for many historic expeditions. In 1776, the Dominguez-Escalante expedition of Spanish explorers traversed the monument in search of a safe crossing of the Colorado River. Later, Mormon exploring parties led by Jacob Hamblin crossed south of the Vermilion Cliffs on missionary expeditions to the Hopi villages. Mormon pioneer John D. Lee established Lee's Ferry on the Colorado River just south of the monument in 1871.

The monument's vegetation is a unique combination of cold desert flora and warm desert grassland. It includes one threatened species, Welsh's milkweed. California Condors have been reintroduced into the monument in an effort to establish another wild population of this highly endangered species. Desert bighorn sheep, pronghorn antelope, mountain lion, and other mammals roam the canyons and plateaus. The Paria River supports sensitive native fish, including the flannelmouth sucker and the speckled dace.

The **California Coastal National Monument** was designated by Presidential proclamation on January 11, 2000. Totaling 883 acres in land surface, it runs the entire 840-mile length of the California coast and extends 12 nautical miles seaward from the shoreline, encompassing thousands of BLM-administered islands, rocks, exposed reefs, and pinnacles above mean high tide. Cooperatively managed with other Federal agencies, state agencies, local governments, universities, and private interests, the primary purpose of the monument is to protect important biological and geological values.

Magnificent vistas lure hikers to California's King Range National Conservation Area, one of the last pristine stretches of California coastline. (Bob Wick, BLM Arcata Field Office)

The monument contains many geologic formations that provide unique habitat, such as sensitive feeding and nesting habitat for an estimated 200,000 breeding seabirds, including gulls, the endangered California least tern, and the brown pelican. Studies as early as 1970 noted that the rookeries on which these birds breed are unprotected and in danger; the number of breeding pairs for some of the species continues to decline. The monument also provides forage and breeding habitat for several mammal species, including a number of threatened pinnipeds.

The **Carrizo Plain National Monument**, designated by Presidential proclamation on January 17, 2001, is adjacent to the southwest edge of the San Joaquin Valley in eastern San Luis Obispo County. The 204,107-acre monument is a diverse complex of habitats similar to those in the San Joaquin Valley that have become fragmented or destroyed.

Full of natural splendor and rich in human history, the majestic grasslands and stark ridges in the monument contain exceptional objects of scientific and historic interest. Since the mid-1800s, large portions of the grasslands that once spanned the entire 400-mile expanse of California's nearby San Joaquin Valley have been eliminated by extensive land conversion to agricultural, industrial, and urban land uses. The monument, which is dramatically bisected by the San Andreas Fault zone, is the largest undeveloped remnant of this ecosystem, providing crucial habitat for the long-term conservation of the many endemic plant and animal species that still inhabit the area.

The monument offers a refuge for endangered, threatened, and rare animal species such as the San Joaquin kit fox, the California condor, the blunt-nosed leopard lizard, the giant kangaroo rat, the San Joaquin antelope squirrel, the longhorn fairy shrimp, and the vernal pool fairy shrimp. It also supports important populations of pronghorn antelope and tule elk, as well as being home to many rare and sensitive plant species. Despite past human use, the size, isolation, and relatively undeveloped nature of the area make it ideal for long-term conservation of the dwindling flora and fauna characteristic of the San Joaquin Valley region.

The monument is also rich with evidence of its prehistoric and historic past. Painted Rock, a sacred ceremonial site of the Chumash People, rises from the grassland, while remnants of homesteads, farms, and mining operations dot the remainder of the Plain.

Besides its grasslands and wildlife habitat, the area is world-famous for its spectacular exposures of fault-generated landforms. In 1857, the strongest earthquake in California's recorded history ripped through the San Andreas Fault, wrenching the western side of the monument 31 feet northward. The monument encompasses Soda Lake, the largest remaining natural alkali wetland in southern California and the only closed basin within the coastal mountains.

The **Santa Rosa/San Jacinto Mountains National Monument** is the first BLM-managed national monument that was designated by Congressional legislation; this legislation was signed by the President on October 24, 2000. The 86,400-acre monument, which lies south and west of Palm Springs, California, has a dramatic landscape rising abruptly from below sea level to the snow-capped San Jacinto Peak at 10,804 feet. The BLM's portion of the monument occurs at low-lying elevations from below sea level to roughly 2,500 feet. Vegetation ranges from creosote and desert flora to chaparral. The Forest Service manages 64,400 acres within the monument, primarily at elevations ranging from 2,000 feet to 7,500 feet. Vegetation here ranges from chaparral to a mixed conifer, with moderate to steep slopes and deeply dissected canyons.

The monument provides habitat for an endangered population of desert bighorn sheep. The Peninsular Range's population of desert bighorn sheep was listed as endangered by the United States Fish and Wildlife Service on March 18, 1998. Over the last 26 years, the population has declined dramatically from about 1,100 animals to its current population of less than 400 sheep. More than 500 plant and animal species, including the bighorn sheep, make their home in the monument. These include the California red-legged frog, southern yellow bat, desert tortoise, desert slender salamander, and the Least Bell's vireo.

The Santa Rosa Mountains have served as the homeland for hundreds of generations of Cahuilla. Direct evidence links the tribe to this area for at least 3,000 years. Within the Santa Rosas are sacred sites such as Agua Alta and landscape features of great importance to Cahuilla history. A network of trails connects village sites, campsites, and other areas of importance. The Cahuilla lived in the region for at least 3,000 years, up until the late nineteenth century.

Although the BLM and Forest Service are the primary land managers in the monument, a range of state and Federal agencies also manage small portions of the monument. There is also around 60,000 acres of private land within the monument's boundaries.

The **Canyons of the Ancients National Monument**, designated by Presidential proclamation on June 9, 2000, is located in southwest Colorado. This 163,892-acre monument contains the highest known density of archaeological sites in the Nation and features evidence of cultures and traditions spanning thousands of years.

Consisting of intertwined natural and cultural resources, the monument's rugged landscape has contributed greatly to the protection of its scientific and historic objects. The more than 20,000 archeological sites reflect all of the physical components of past human life: villages, field houses, check dams, reservoirs, great kivas, cliff dwellings, shrines, sacred springs, agricultural fields, petroglyphs, and sweat lodges. Portions of the area have more than 100 sites per square mile.

The monument is known for its sheer sandstone cliffs, with mesa tops rimmed by caprock and deeply incised canyons. These formations are crucial habitat for a wide variety of wildlife species, including the Mesa Verde nightsnake and the long-nosed leopard lizard.

The **Craters of the Moon National Monument** was established by President Coolidge on May 2, 1924. Since 1924, the monument has been expanded through five presidential proclamations issued in accordance with the Antiquities Act. The most recent and largest expansion of the monument occurred November 9, 2000, when a Presidential Proclamation enlarged the monument thirteenfold. The monument now encompasses a total area of 754,863 acres, of which 273,847 acres are under the jurisdiction of the BLM.

The expanded monument assures the protection of the entire Great Rift volcanic zone. It encompasses a remote area which includes the Kings Bowl lava field, Wapi lava field, and the Bear Trap lava tube. The Bear Trap lava tube is an unusual 15-mile-long cave system that contains well-preserved lava stalactites and curbs that mark the high level of flowing lava on the lava tube walls. The monument is managed cooperatively by the National Park Service and the BLM. The National Park Service has primary management authority over the portion of the monument that includes the exposed lava flows. The BLM has primary management authority over the remaining portion.

Basaltic fissure volcanic eruptions, such as the ones that produced Idaho's Great Rift in Craters of the Moon National Monument, are characterized by relatively slow extrusion of lavas from fissures or vents. (Jerry Sintz, BLM Utah State Office (retired))

The monument is a geologic wonder cast in a wild and remote landscape. Its central focus is the Great Rift, a 62-mile-long crack in the earth's crust. The Great Rift is the source of a remarkably preserved volcanic landscape with an array of exceptional features. Craters, cinder coves, lava tubes, deep cracks, and vast lava fields form a beautiful volcanic sea on central Idaho's Snake River Plain. Volcanic eruptions first occurred at Craters of the Moon about 15,000 years ago. The most recent eruptions ended about 2,100 years ago and were likely witnessed by the Shoshone people. The volcanic area now lies dormant, but its eight eruptive periods formed 60 lava flows that traveled as far as 45 miles from their vents. Some of the lava flowed around areas of higher ground, forming isolated islands of vegetation called "kipukas." Today, these kipukas provide a window on the vegetation communities of the past. They contain some of the last pristine vegetation in the Snake River Plain, including 700-year-old juniper trees and relic stands of sagebrush and native bunchgrass.

The **Pompeys Pillar National Monument**, designated by Presidential proclamation on January 17, 2001, was initially designated as a national historic landmark in 1965. The key feature of the 51-acre monument is a massive sandstone outcrop that rises 150 feet from an almost two-acre base on the banks of the Yellowstone River, east of Billings, Montana. The pillar's premier location at a natural ford in the Yellowstone River and its geologic distinction as the only major sandstone formation in the area have made it a celebrated landmark and outstanding observation point for more than 11,000 years of human occupation.

Hundreds of markings, petroglyphs, and inscriptions left by visitors have transformed this geologic phenomenon into a living journal of the American West. The monument's most notable visitor, Captain William Clark of the Lewis and Clark Expedition, arrived at Pompeys Pillar on July 25, 1806, on his return trip from the Pacific coast. Clark marked his presence by engraving his name and the date of his visit on the outcrop. This simple inscription is the only remaining physical evidence of Lewis and Clark's epic journey.

Archaeological evidence of past occupation of the Pillar area by Native Americans has been discovered at various depths below ground. These materials appear to be the remains of hunting and living camps, probably occupied by relatively small groups of people for short periods of time.

Pompeys Pillar is home to many wildlife species and serves area communities as a viewing area. More than 100 different bird species have been noted in the area, including owls, sandpipers, terns, and bald eagles. Deer, fox, coyotes, raccoons, and numerous small mammals, amphibians, and reptiles call the Pillar home. Much of the wildlife population is a result of the site's thriving riparian zone, a healthy plant community of grasses, willows, and cottonwood trees that stabilize the river bank and provide important habitat.

The **Upper Missouri River Breaks National Monument,** designated by Presidential proclamation on January 17, 2001, includes an ecosystem that parallels the Upper Missouri National Wild and Scenic River through north-central Montana. The 374,976-acre monument contains a spectacular array of biological, geological, and historical objects of interest.

The area has remained largely unchanged in the nearly 200 years since Meriwether Lewis and William Clark traveled through it on their epic journey. Lewis and Clark first encountered the Breaks country of the monument on their westward leg. In his journal, Clark described the abundant wildlife of the area, including mule deer, elk, and antelope, and on April 29, 1805, the Lewis and Clark expedition recorded the first bighorn sheep observation by non-Indians in North America.

The monument boasts the most viable elk herd in Montana and one of the premier bighorn sheep herds in the continental United States. It contains essential winter range for sage grouse as well as habitat for prairie dogs. Abundant plant life along the River and across the Breaks country supports this wildlife. The lower reach of the Judith River, just above its confluence with the Missouri, contains one of the few remaining fully functioning cottonwood gallery forest ecosystems on the Northern Plains. Arrow Creek contains the largest concentration of antelope and mule deer in the monument, as well as important spawning habitat for the endangered pallid sturgeon. An undammed tributary to the Missouri River, Arrow Creek is a critical seed source for cottonwood trees for the flood plain along the Missouri.

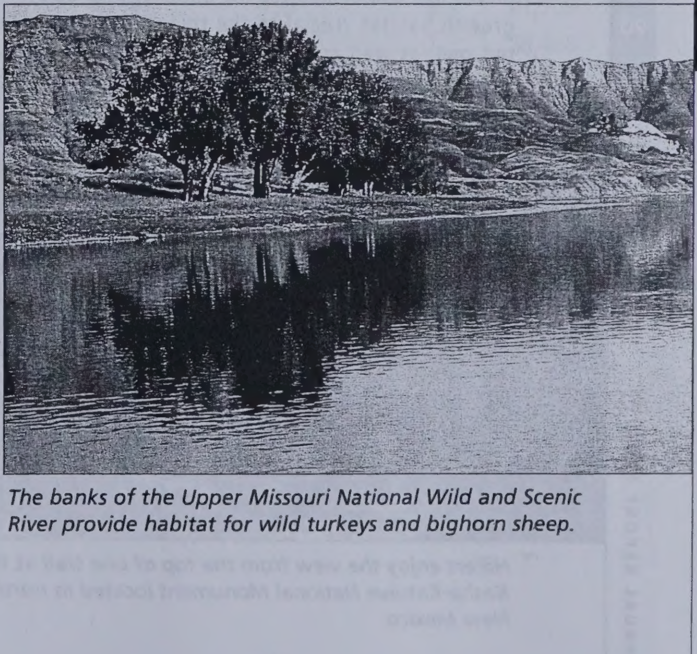
The cliff faces in the monument provide perching and nesting habitat for many raptors, including the sparrow hawk, ferruginous hawk, peregrine falcon, prairie falcon, and golden eagle. Several pairs of bald eagles nest along the river in the monument and many others visit during the late fall and early winter. Shoreline areas provide habitat for great blue heron, pelican, and a wide variety of waterfowl. The river and its tributaries in the monument host 48 fish species, including goldeye, drum, sauger, walleye, northern pike, channel catfish, and small mouth buffalo. The monument has one of the six remaining paddlefish populations in the United States. The river also supports the blue sucker, shovel nose sturgeon, sicklefin, sturgeon chub, and the endangered pallid sturgeon.

Long before the time of Lewis and Clark, the area was inhabited by numerous native tribes, including the Blackfeet, Assiniboin, Gros Ventre (Atsina), Crow, Plains Cree, and Plains Ojibwa. Pioneers and soldiers followed Lewis and Clark in the 1830s, establishing Fort Piegan, Fort McKenzie, and Fort Benton. Remnants of this rich history are scattered throughout the monument, and the River corridor looks much the same as it did centuries ago.

The **Kasha-Katuwe Tent Rocks National Monument** was designated by Presidential proclamation on January 17, 2001. The 4,114-acre monument is located in north-central New Mexico between Albuquerque and Santa Fe. Kasha-Katuwe or "white cliffs" in Keresan—the traditional language for the Pueblo de Cochiti—is an unique geological area that features large, tent-shaped rocks that hug the steep cliffs of Peralta Canyon.

The rocks in the monument were created by the powerful forces of vulcanism and erosion, which have built up and then torn down this landscape. During the last million years, a tremendous volcanic explosion northwest of Kasha-Katuwe Tent Rocks spewed rock and ash for hundreds of square miles, leaving volcanic debris up to 400 feet thick. Over time, water cut into these deposits, creating canyons, arroyos, and other area features. The cone-shaped rock formations are wind- and water-eroded pumice and tuff deposits. Their hard, erosion-resistant caprocks protect the softer "tents" below. While uniform in shape, the tent rock formations vary in height from just a few feet to almost 100 feet.

The complex landscape and spectacular geologic scenery of the monument have been a focal point for visitors for centuries. Human settlement is believed to have begun in the monument as a series of campsites during the Archaic period, dating from approximately 5500 B.C. During the fifteenth century, several large ancestral pueblos were established in the area. Their descendants, the Pueblo de Cochiti, still inhabit the surrounding area. Although the Spanish explorer Don Juan de Oñate reached the Pajarito Plateau in 1598, it was not until the late eighteenth century that families began to claim land grants around Tent Rocks from the Spanish Crown. Remnants of human history are scattered throughout the monument.



The banks of the Upper Missouri National Wild and Scenic River provide habitat for wild turkeys and bighorn sheep.

The **Cascade-Siskiyou National Monument**, designated by Presidential proclamation on June 9, 2000, is located in southern Oregon, at the intersection of the Klamath and Cascade Mountains. The 52,947-acre monument is home to a spectacular variety of rare and beautiful species of plants and animals, whose survival in this region depends upon its continued ecological integrity.

The monument is an ecological wonder, with biological diversity unmatched in the Cascade Range. It encompasses a rich enclave of biological resources at a biological crossroads—the interface of the Cascade, Klamath and Siskiyou ecoregions—in an area of unique geology, biology, climate, and topography. The ecology of the area is influenced by the region's extremely complex geology. Most of the monument lies within the relatively young, volcanic Cascade Range; however, the southwestern portion of the monument is in the much older Siskiyou Mountains. At 425 million years, the rocks of the Siskiyou Mountains are the oldest known in Oregon.

Plant communities present a rich mosaic of grass and shrublands, Garry and California black oak woodlands, juniper scablands, mixed conifer and white fir forests, and wet meadows. Stream bottoms support broad-leaf deciduous riparian trees and shrubs. Special plant communities include rosaceous chaparral and oak-juniper woodlands. The monument also contains many rare and endemic plants, such as Greene's Mariposa lily, Gentner's fritillary, and Bellinger's meadowfoam.

This monument supports an exceptional range of fauna, including one of the highest diversities of butterfly species in the United States. The Jenny Creek portion of the monument is a significant center of freshwater snail diversity and is home to three endemic fish species, including a long-isolated stock of redband trout. It contains important populations of small mammals, reptile and amphibian species, and ungulates, including important winter habitat for deer. It also contains old-growth habitat crucial to the threatened northern spotted owl, as well as numerous other bird species such as the western bluebird, the western meadowlark, the pileated woodpecker, the flammulated owl, and the pygmy nuthatch.

Hikers enjoy the view from the top of one trail at the Kasha-Katuwe National Monument located in northern New Mexico.

This geologically and ecologically diverse region has provided a home for native peoples for thousands of years. Numerous archaeological and historical sites, including areas of traditional cultural importance such as spiritual sites and root-gathering areas, are found throughout the monument. Archaeological surveys in the Cascade-Siskiyou National Monument have located close to 100 sites relating to native peoples' use of the area. These are typically areas where open meadows, oaks, and game, including deer and elk, still exist. The monument also contains remnants of the historic Oregon/California Trail. Rock alignments, blazed trees, and artifacts such as cast-off ox shoes document this historic route.

The **Grand Staircase-Escalante National Monument**, which was BLM's first national monument, was created by Presidential proclamation on September 18, 1996. It is located in southern Utah approximately 290 highway miles south of Salt Lake City and 250 miles east of Las Vegas. The 1,870,800-acre monument features a dramatic, multi-hued landscape that is rich in both natural and human history. It represents a unique combination of archaeological, historical, paleontological, geological, and biological resources.

The monument's strikingly beautiful and scientifically important lands are divided into three distinct regions: the Grand Staircase, the Kaiparowits Plateau, and the Canyons of the Escalante. The Grand Staircase consists of five great geological steps that ascend northward across the southwest corner of the monument. This Grand Staircase—the Chocolate, Vermilion, White, Gray, and Pink Cliffs—spans five different life zones from Sonoran desert to coniferous forests. It is a masterpiece of geological and biological diversity.

The Kaiparowits Plateau is a vast wedge-shaped block of mesas and deeply incised canyons tower above the surrounding canyonlands. This isolated, rugged plateau is refuge for wildlife, rare plants, and a few adventure-ready individuals equipped to handle profound solitude and uncompromising wild country. Kaiparowits is a Paiute name meaning "Big Mountain's Little Brother." Many sites from prehistoric cultures have been recorded on the Plateau, and many more are preserved for future study.

The Escalante River cascades off the southern flank of the Aquarius Plateau, winding through a 1,000-mile maze of interconnected canyons known as the Canyons of the Escalante. This magical labyrinth is one of the scenic wonders of the West. Even though Spanish explorer and priest Father Silvestre Velez de Escalante never saw the river, his is the namesake given by the Powell survey crew that discovered and named the Escalante River in 1872.

Three major plant communities meet in the monument, making it one of the richest floristic regions in the Intermountain West. Plants from the Mojave and Sonoran Deserts and the Great Basin are all found here, plus a few species from the Great Plains. In spite of its often barren appearance, the monument has a surprisingly diverse fauna. From elk that migrate to lower elevations in winter to pronghorns and pack rats, the monument is home to more than 300 species of amphibians, birds, mammals, and reptiles.

National Conservation Areas: The BLM manages 13 national conservation areas (NCAs) totaling almost 14 million acres. Congress designates national conservation areas so that present and future generations of Americans can benefit from the conservation, protection, enhancement, use, and management of these areas and enjoy their natural, recreational, cultural, wildlife, aquatic, archeological, paleontological, historical, educational, and/or scientific resources and values. Table 9 shows the name, location, and BLM-managed acreage of these twelve areas.

The **Steese National Conservation Area**, designated on December 2, 1980, is located approximately 70 miles northeast of Fairbanks, Alaska, and is set back from the Steese Highway (Alaska Route 2). Consisting of two sections that total 1,194,923 acres, the NCA is home to the Mount Prindle Region, the Birch Creek National Wild and Scenic River (designated as wild), crucial caribou calving grounds and home range, and Dall sheep habitat.

The Mount Prindle Region contains excellent examples of both glaciated landforms and periglacial features in close proximity. These illustrate how two sets of different cold-climate processes produce very different landscapes. At least four glacial advances spanning several hundred thousand years are evident. The small glaciers of Mount Prindle were isolated in a vast unglaciated region and were barely nourished by the ice age climates. The features marking the fluctuations of these small glaciers are useful in studies of past climates. Rock climbing and hunting are popular activities occurring within this area.

Birch Creek provides for a wide variety of primitive-based recreation opportunities. Float-boating in canoes or rafts, nature observation, fishing, and hunting are the major recreational activities. Attractive, natural campsites are abundant along the river. Winter activities include snowmobiling, cross-country skiing, and trapping. The Yukon Quest International Sled Dog Race between Fairbanks and Whitehorse traverses portions of Birch Creek National Wild River. Dog mushing is a popular winter activity within the Steese National Conservation Area, and the frozen Birch Creek makes a good winter "highway."

The **Gila Box Riparian National Conservation Area** was designated on November 28, 1990. This 22,047-acre area is located in southeastern Arizona near Safford. When Congress created the Gila Box Riparian National Conservation Area, the principal objective was

Table 9 - National Conservation Areas

National Conservation Area	State	BLM Acreage	Other Federal Acreage	Non-Federal Acreage [1]	Total Acreage
Steese	Alaska	1,194,923	0	13,883	1,208,806
Gila Box Riparian	Arizona	22,047	0	0	22,047
Las Cienegas	Arizona	41,960	0	0	41,960
San Pedro Riparian	Arizona	56,400	0	0	56,400
California Desert	California	10,671,080	8,658,814	6,577,192	25,907,086
King Range	California	57,288	0	4,995	62,283
Colorado Canyons	Colorado	122,182	0	0	122,182
Gunnison Gorge	Colorado	57,725	0	0	57,725
Snake River Birds of Prey	Idaho	483,074	1,616	106,345	591,035
Black Rock Desert-High Rock Canyon Emigrant Trails	Nevada	797,039	0	0	797,039
Red Rock Canyon	Nevada	196,890	0	0	196,890
Sloan Canyon	Nevada	48,438	0	0	48,438
El Malpais	New Mexico	227,100	2,500	32,522	262,122
Total Acreage		13,976,146	8,662,930	6,734,937	29,374,013

[1] The amount of state and private land acreage encompassed in the National Conservation Area units is unknown at this time except as noted.

to conserve, protect, and enhance the riparian and associated values of the area. Four perennial waterways—the Gila River, Bonita Creek, Eagle Creek, and San Francisco River—are vitally important to this remarkable place.

Not only does Gila Box hold one of the most significant riparian zones in the Southwest, but it also offers tremendous scientific, cultural, scenic, recreational, and other associated values. It is one of only two riparian national conservation areas in the Nation. Bonita Creek, popular for birding and picnicking, is lined with large cottonwoods, sycamores, and willows. The Gila River section is composed of patchy mesquite woodlands, mature cottonwood trees, sandy beaches, and grand buff-colored cliffs. Cliff dwellings, rock art, and historic homesteads show evidence of the occupation of this area by earlier man. Wildlife, including Rocky Mountain bighorn sheep, and over 200 species of birds make their home in this cool year-round desert oasis.

The **Las Cienegas National Conservation Area** was designated on December 6, 2000. This 41,960-acre area is located about 50 miles southeast of Tucson. Much of the area, which came under the management of the BLM in June 1988, was formerly part of several ranches.

Storm clouds gather over the grasslands of Las Cienegas National Conservation Area. Dramatic afternoon monsoons are typical of southern Arizona in late summer.

Prior to the BLM's acquisition, this area faced an uncertain future that almost certainly included housing and commercial development. Such development would have eliminated the sweeping vistas and substantially harmed the watershed and habitat needed for rare native fish and a rich diversity of other wildlife. Pima and Santa Cruz County Supervisors officially requested that the BLM become involved in protecting this area.

This national conservation area includes a variety of unique and rare vegetative communities, including five of the rarest habitat types in the American Southwest: cienegas (marshlands), cottonwood-willow riparian forests, sacaton grasslands, mesquite bosques, and semi-desert grasslands. Cienega Creek, with its perennial flow and lush riparian corridor, forms the lifeblood of the national conservation area. The area is home to a great diversity of plant and animal life, including several threatened or endangered species.

Rare prehistoric sites, historic travel routes, mines, and mining towns are all present in the national conservation area. The Empire Ranch House, listed on the National Register of Historic Places, is currently being restored. Scientists believe humans occupied this area as long as 12,000 years ago.

The **San Pedro Riparian National Conservation Area** was designated on November 18, 1988. This 56,400-acre area is located in southeastern Arizona between the international border (United States and Mexico) and St. David, Arizona. The primary purpose for the designation was to protect and enhance the desert riparian ecosystem, a rare remnant of what was once an extensive network of similar riparian systems throughout the Southwest.

Wildlife abounds because of the abundant food, water, and cover within and surrounding the riparian zone. The national conservation area supports over 350 species of birds, 80-plus species of mammals, two native fish species, several introduced species of fish, and more than 40 species of amphibians and reptiles. The area attracts thousands of bird-watchers from all over the world each year because roughly half of the number of known breeding species in North America are represented in this area.

The national conservation area contains over 250 recorded prehistoric and historic sites and is likely to contain many more. These range from sites dating back approximately 11,000 years from the Clovis Culture to the Presidio (fortified settlement) Santa Cruz de Terrenate that was established by Spanish troops in 1775 or 1776, and the ruins of some 19th century mining towns.

The **California Desert National Conservation Area** was designated on October 21, 1976. Its 10,671,080 acres account for more than two-thirds of the total national conservation area acreage managed by the BLM. This desert area offers scenic beauty in its vast sandscapes and rugged canyon gorges.

Scientists recognize three deserts within the California Desert: the Mojave, the Sonoran, and a small portion of the Great Basin. In the California Desert, a variety of land forms, including valleys, bajadas, pediments, alluvial fans, rough-hewn mountain ranges, washes, sand dunes, and dry lakebeds, testify both to the geologic variety of this region and to its relative youth as a desert.

While the word "desert" usually brings to mind images of vast areas devoid of life, a wide variety of plant life actually flourishes within the California Desert Conservation Area. From the common creosote bush to an ancient stand of bristlecone pine, this vegetation furnishes food and shelter for equally varied wildlife populations. California's state reptile, the desert tortoise, is one of its most famous wildlife residents, but the area is also home for many others, including lizards, deer, migratory birds, kangaroo rats, bighorn sheep, and even several species of fish. Domestic cattle and sheep have grazed the area since the 1890s. Wild horses and burros— descendants of the Old West—still roam freely in the area.

The California Desert is one of the most highly mineralized regions in the Nation. Today's miners use advanced technologies to collect microscopic gold, rare earths, sodium, borates, phosphates, sand and gravel, and other important resources for our everyday lives.

The extremes of the desert climate have actually protected a variety of historic and cultural sites. Human use and habitation of the area long preceded European contact in the mid-16th century and acquisition of the area by the United States in the mid-19th century. Native American cultures hunted and foraged for food, set down permanent and seasonal village sites, mined and quarried for common and exotic stones, flood irrigated land for agriculture, and traded goods through an elaborate network of foot trails.

The **King Range National Conservation Area** was designated on October 21, 1970. This 57,288-acre area encompasses 35 miles of remote coastline known as California's Lost Coast. A spectacular meeting of land and sea is the dominant feature of the area.

Mountains seem to thrust straight out of the surf, a precipitous rise unsurpassed on the continental United States coastline. King Peak, the highest point at 4,087 feet, is only three miles from the ocean. The King Range is severely folded and faulted. Three of the large "plates" that make up the earth's crust grind together just offshore. The King Range is at the edge of the North American Plate, which is being forced upward from the two offshore plates.

Offshore rocks, tidepools, and kelp beds are inhabited by seals, sea lions, and a variety of marine birds. California grey whales can be spotted offshore in winter and spring. The mountains are a mix of Douglas fir forest, chaparral, and grassland, providing habitat for blacktailed deer, black bear, and Roosevelt elk. Nearly 300 species of native and migratory birds have been spotted in the King Range, making it a birders' paradise. The old-growth forest is important habitat for the northern spotted owl, bald eagle, and Coopers hawk.

The **Colorado Canyons National Conservation Area** was designated on October 24, 2000. Located in west-central Colorado, this national conservation area encompasses 122,182 acres and includes the 75,439-acre Black Ridge Canyons Wilderness.

This area is remarkable for its diverse landscape. The wilderness is dominated by seven spectacular red-rock canyons separated by high mesas. These sandstone canyons, which drain to the Colorado River, are 3 to 12 miles in length and almost 1,000 feet deep. Erosional features include arches, spires, windows, monoliths, fins, and alcoves. Many canyon floors have exposed black Precambrian rock with inner canyons that feature waterfalls and plunge pools.

Cottonwoods, willows, and box elders in the canyon bottoms shade hikers and contribute to outstanding primitive recreation opportunities. Pinyon-juniper woodlands dominate the upland mesas. Desert bighorn sheep, deer, elk, and mountain lion roam the wilderness.

Rising as high as 1,200 feet, the Dumont Dunes Off-Highway Vehicle Area provides riders with outstanding views of the surrounding California desert. (James Pickering, BLM California State Office)

The national conservation area includes numerous rock art sites and archaeological remains of the Fremont people. The Trail Through Time includes a dinosaur quarry—an ancient watering hole for thousands of dinosaurs over thousands of years—that is now an active paleontological dig site.

The **Gunnison Gorge National Conservation Area** was designated on October 21, 1999. Consisting of 57,725 acres, this area is located in west-central Colorado, just downstream from the Black Canyon of the Gunnison National Park.

The national conservation area encompasses a diverse landscape ranging from "adobe badlands" and rugged pinyon-juniper-covered slopes to the spectacular double canyon of the Gunnison Gorge Wilderness Area. Humans have utilized this area for 13,000 years, and archeological evidence from Paleo-Indian hunters to the later Archaic and protohistoric Ute cultures is scattered throughout the gorge.

This national conservation area supports an equally diverse range of recreational uses: white-water boating and Gold Medal trout fishing in the Gunnison River, big-game hunting for mule deer and elk, off-highway vehicle use in Peach Valley, domestic sheep and livestock grazing, sightseeing, wildlife photography, and wilderness hiking and backpacking.

The **Snake River Birds of Prey National Conservation Area**, which was designated on August 4, 1993, is located only 20 miles south of Boise, Idaho. The Snake River Birds of Prey National Conservation Area contains 483,074 acres and includes 81 miles of the Snake River, 65,000 acres of critical nesting raptor (bird of prey) habitat, and almost 420,000 acres of prey habitat.

The national conservation area is home to the densest concentration of nesting raptors in North America and one of the densest such concentrations in the world. Canyon walls along the Snake River, ranging up to 600 feet high, provide abundant nest sites for the raptors. More than 800 pairs of raptors representing 15 species nest here, including eagles, falcons, hawks, and owls. An additional nine raptor species use the area during migrations or as wintering areas. Deep, wind-blown soils cover expansive plateaus above the canyon.

American kestrels are found in the Snake River Birds of Prey National Conservation Area near Boise, Idaho.

An unusual variety and high number of small mammals burrow in the fine textured soils and find food and cover in the dense grasses and shrubs that grow on the plateau. The abundant prey and soft soils support one of the densest badger populations in the world. Mammals such as Paiute ground squirrels, blacktailed jackrabbits, pocket gophers, kangaroo rats, and deer mice are common prey species for the raptors.

The Snake River Canyon within the national conservation area contains some of the oldest and most remarkable archaeological sites in Idaho. Over 200 sites are recorded, including numerous outstanding petroglyphs. Human occupation has been dated to 10,000 B.C. The Black Butte-Guffrey Butte Archaeological District, listed on the National Register of Historic Places, is located entirely within the national conservation area.

The **Black Rock Desert-High Rock Canyon Emigrant Trails National Conservation Area** was designated on December 21, 2000, and includes 797,039 acres of BLM-managed public lands in northwestern Nevada. It protects the last nationally significant, untouched segments of the historic California emigrant trails, including wagon ruts, historic inscriptions, and a wilderness landscape largely unchanged from when pioneers moved westward in the 1800s.

One of the national conservation area's most prominent geologic features is the Black Rock Desert Playa, where the curvature of the Earth may be observed. This playa is a remnant of the ancient Lake Lahontan and is one of the largest playas in the world. Some of the largest natural potholes in North America also are located in the national conservation area.

The Black Rock Desert and High Rock Canyon areas are unique segments of the Northern Great Basin and contain broad representation of the Great Basin's land forms and plant and animal species, including golden eagles and other birds of prey, sage grouse, mule deer, pronghorn antelope, bighorn sheep, free-roaming horses and burros, threatened fish, and sensitive plants.

The national conservation area includes segments of historic California emigrant trails and a portion of the John C. Fremont exploration route. These trails include wagon ruts and historic inscriptions in settings nearly unchanged from pioneer days. The area also includes numerous prehistoric and historic Native American sites, including woolly mammoth sites.

The **Red Rock Canyon National Conservation Area** was designated on November 16, 1990. This

196,890-acre area is located 10 miles west of Las Vegas, Nevada. It features unique geologic formations, plants, and animals that represent some of the best examples of the Mojave Desert.

The most significant geologic feature of Red Rock Canyon is the Keystone Thrust Fault. About 65 million years ago, it is believed that two of the Earth's crustal plates collided with such force that part of one plate of gray limestone was thrust up and over the younger red sandstone. The Keystone Thrust Fault extends from the Cottonwood Fault (along State Route 160) thirteen miles northward to the vicinity of La Madre Mountain, where it is obscured by more complex faulting. More than one million visitors each year enjoy the spectacular landscapes as well as numerous climbing and hiking opportunities and interpretative programs sponsored by the BLM.

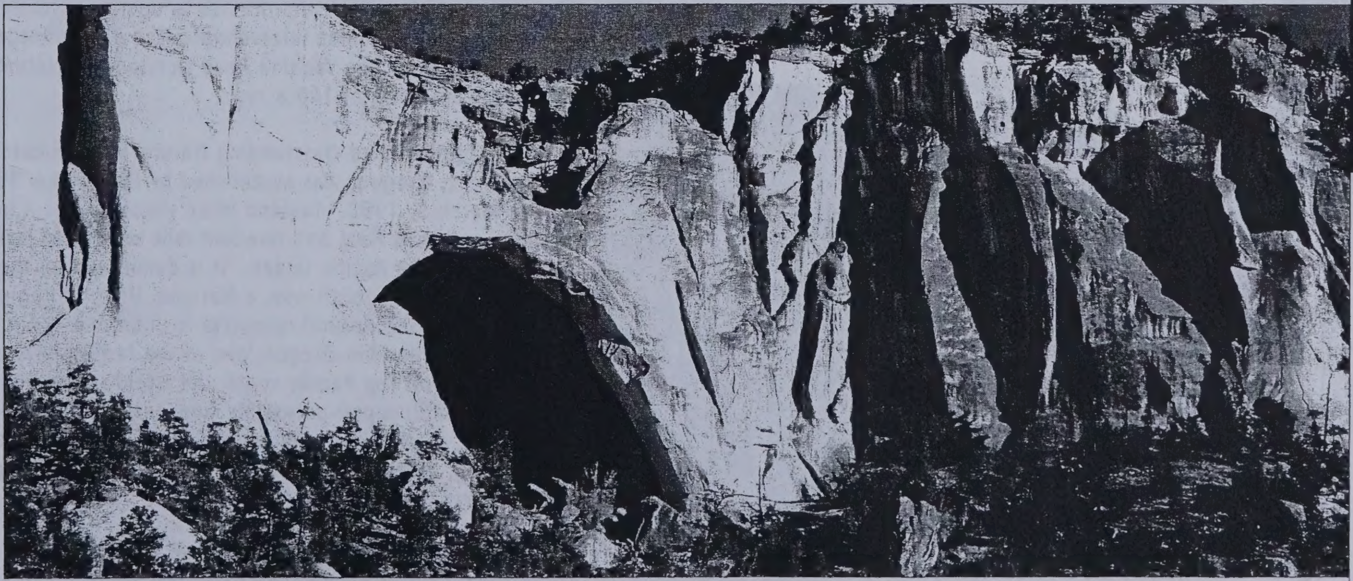
Scant rainfall and scarce permanent water, along with desiccating winds and high temperatures, make this a harsh environment for plants and wildlife, yet a surprising number of plants and animals inhabit the national conservation area. Over 100 bird species, 45 mammal species, and a variety of reptiles and amphibians, including the threatened desert tortoise, can be found.

For much of the past 600 million years, the land that is now Red Rock Canyon National Conservation Area was the bottom of a deep ocean basin and the western coast of North America was in present-day western Utah. A rich variety of marine life flourished in those waters, leaving behind deposits of shells and skeletons more that 9,000 feet thick that were eventually compressed into limestone and similar carbonate rocks. Petroglyphs are also found in Red Rock Canyon.

The **Sloan Canyon National Conservation Area** was designated on November 6, 2002, and is the most recently designated national conservation area. It includes 48,438 acres and is located about 15 miles south of Las Vegas, Nevada. Sloan Canyon contains unique scenic and geological features and extraordinary cultural resources. The NCA includes the northern portion of the McCullough Range, which is volcanic in origin. The peaks are rounded, with a steep eastern escarpment and a gradual western slope. Elevations span from 2,000 feet at the eastern base of the range to 5,092 feet at Black Mountain. The ridgeline offers excellent views of the Las Vegas valley, numerous ranges, and the Eldorado and Jean dry lakes. The area primarily supports a creosote bush community comprising barrel cactus, Joshua trees, cholla, and prickly pear.

The most interesting cultural resources consist of petroglyphs, which are Native American carvings etched into the canyon walls. Over 1,700 individual design elements on more than 300 rock panels have been documented. Archaeologists believe the petroglyphs represent native cultures dating from the Archaic to the Historic era. It is thought that Native Americans hunted bighorn that came into the canyon to obtain water from natural tanks that filled during the late July and early August rainy season.

The **El Malpais National Conservation Area** was designated on December 31, 1987, and includes 227,100 acres south of Grants, New Mexico, and west of Albuquerque. El Malpais translates to "the badlands" in the original Spanish. El Malpais is managed by a joint effort between the National Park Service and the BLM. The area features some of the Nation's most significant geological, cultural, scenic, scientific, and wilderness resources surrounding the rugged Grants Lava Flows.



Pinyon- and juniper-studded sandstone frames La Ventana, a high natural arch located within the El Malpais National Conservation Area.

Volcanic features such as lava flows, cinder cones, pressure ridges, and complex lava tube systems dominate the landscape. Closer inspection reveals unique ecosystems with complex relationships. Sandstone bluffs and mesas border the eastern side, providing access to vast wilderness.

For more than 10,000 years, people have interacted with the El Malpais landscape. Historic and prehistoric sites provide connections to the past. More than mere artifacts, these cultural resources are kept alive by the presence of contemporary Indian groups, including the Puebloan peoples of Acoma, Laguna, and Zuni, and the Ramah Navajo. These tribes continue their ancestral uses of El Malpais, gathering herbs and medicines, paying respect, and renewing ties.

Cooperative Management and Protection Area: The BLM manages one cooperative management and protection area. The Steens Mountain Cooperative Management and Protection Area, which was designated by Congress on October 30, 2000, consists of 425,550 acres of rugged landscape in southeastern Oregon. The Steens Mountain Advisory Council was established. Cooperative and innovative management projects will be maintained and enhanced between the BLM, private landowners, tribes, and other public interests.

This fault-block range offers a diversity of natural systems that is unique to the northern Great Basin region. From the valley floor of the Alvord Desert at 4,200 feet elevation to the east rim of the fault-block at 9,700 feet elevation, Steens Mountain rises 5,500 feet in less than three miles. The mountain is approximately 60 miles in length, extending from Riddle Mountain on the north to Alvord Peak and Long Hollow on the south. Its width is approximately 40 miles from the Alvord Desert on the east, across the fault-block to the Blitzen and Catlow Valleys on the west. Steens Mountain offers exceptional ecological and geological diversity.

Hikers are treated to majestic views into glacially carved Kiger Gorge at Steens Mountain. (Mark Armstrong, BLM Burns District Office)

The mountain provides visitors with spectacular views of deep, glacial gorges; stunning, colorful alpine wildflower meadows; high desert communities; and the opportunity to see pronghorn antelope, elk, mule deer, bighorn sheep, and raptors. The designating legislation created the Donner and Blitzen Redband Trout Reserve to conserve, protect, and enhance redband trout and provide opportunities for research and education. The 52-mile Steens Mountain Backcountry Byway offers access to four campgrounds on the mountain and affords remarkable views of Kiger Gorge.

In 1860, Major Enoch Steen was sent by the U.S. Army to protect the settlers from Indians and to determine the feasibility of a road from southeastern Oregon to the Willamette Valley. His party established several military posts in the area. The remains of a number of homestead cabins and ranch buildings also dot the area.

National Recreation Area: A national recreation area is an area designated by Congress to assure the conservation and protection of natural, scenic, historic, pastoral, and fish and wildlife values and to provide for the enhancement of recreational values. The White Mountains National Recreation Area in Alaska encompasses 998,772 million acres and is named for its unusual, jagged, white limestone ridgeline. One of its most prominent features is a 127-mile national wild river segment of Beaver Creek, which flows from the high alpine tundra of Mount Prindle.

Outstanding Natural Areas: Outstanding natural areas are protected lands designated either by Congress or administratively by an agency to preserve exceptional, rare, or unusual natural characteristics and to provide for the protection or enhancement of natural, educational, or scientific values. These areas are protected by allowing physical and biological processes to operate, usually without direct human intervention. The BLM manages one such area, the Yaquina Head Outstanding Natural Area, consisting of 100 acres.

The Yaquina Head Outstanding Natural Area, located in Newport, Oregon, was established by Public Law 96-199 on March 5, 1980. Yaquina Head encompasses a headland one mile long and one-half mile wide that juts due west into the Pacific Ocean. It is dominated by the Yaquina Head Lighthouse, a National Historic Register structure. The natural resources include one of four marine gardens in Oregon, one of the largest seabird rookeries on the Pacific coast, the world's only man-made handicapped-accessible tidepools (in a restored quarry), marine mammal resting sites, and gray whale viewing, as well as bird and wildflower viewing opportunities in the uplands.

Yaquina Head has been designated as a Globally Important Bird Area by the American Bird Conservancy and the National Audubon Society. The area, which is bordered by sheer cliffs rising 100 feet or more above the ocean, features sea caves and numerous off-shore rocks and islands, making the site spectacular to view under all weather conditions.

Wilderness Areas and Wilderness Study Areas: The BLM administers 161 wilderness areas comprising over 6.5 million acres, as well as 604 wilderness study areas encompassing more than 15.5 million acres. Nearly nine percent of all the BLM-managed public lands are designated as either a wilderness or wilderness study area.

The locations of these wilderness areas and wilderness study areas throughout the western United States ensure that these lands represent the wide diversity of resources found on the public lands. Protective management helps ensure the protection and integrity of natural and biological processes on all public lands. Table 10 shows the location, number, and acreage of wilderness and wilderness study areas managed by the BLM.

Wilderness areas are designated by Congress and are defined by the Wilderness Act of 1964 as a place "where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." Designation is aimed at ensuring that these lands are preserved and protected in their natural condition. Wilderness areas, which are generally at least 5,000 acres in size, offer outstanding opportunities for solitude or a primitive and unconfined type of recreation; such areas may also contain ecological, geological, or other features that have scientific, scenic, or historical value.

A wilderness study area (WSA) is designated by a Federal land management agency as having wilderness characteristics, thus making it worthy of consideration by Congress for wilderness area designation. While Congress considers whether to designate a wilderness study area as a permanent wilderness area, the Federal land management agency, including the BLM, manages the wilderness study area to prevent impairment of the areas' suitability for wilderness designation.

National Wild and Scenic Rivers: The BLM administers some 20 percent of all rivers in the National Wild and Scenic Rivers System, a total of 38 rivers in five states. These nationally recognized rivers comprise more than 2,000 river miles and encompass some of the Nation's greatest diversity and concentrations of recreational, natural, and cultural resources. Included among the BLM-managed wild and scenic rivers is the Fortymile River in Alaska, which is the longest designated river (392 miles) in the National Wild and Scenic Rivers System.

Rivers designated in the National Wild and Scenic Rivers System are classified in one of three categories, depending on the extent of development and accessibility along each section. In addition to being free flowing, these rivers and their immediate environments must possess at least one outstandingly remarkable value—scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values.

Table 10 - Wilderness and Wilderness Study Areas

State	Wilderness		Wilderness Study Areas	
	Number	Acreage	Number	Acreage
Alaska	0	0	1	784,238
Arizona	47	1,396,466	2	63,930
California	76	3,621,312	74	956,819
Colorado	4	139,524	55	623,021
Idaho	1	802	66	1,350,124
Montana	1	6,000	40	448,863
Nevada	24	990,319	85	3,822,421
New Mexico	3	139,281	59	973,726
Oregon	4	186,723	98	2,706,265
Utah	3	27,720	99	3,255,890
Washington	1	7,140	1	5,518
Wyoming	0	0	42	575,841
Total	161[1]	6,515,287	604[1]	15,566,656

[1] Figures in the number columns do not add up to the total shown because some wilderness and wilderness study areas cross State lines and are reported in the number count for each State. The total shown in the number columns are the actual number of wilderness and wilderness study areas. The acreage figures do add up to the totals shown in the acreage columns.

the program is the Big Sky Back Country Byway in Eastern Montana, which crosses a landscape of rolling prairie and "dry land" farmland against a backdrop of breathtaking "big sky" vistas. The Big Sky Back Country Byway stretches for over 100 miles in a north-south route connecting to the Missouri and Yellowstone River trails, made famous by the historic journey of Lewis and Clark during 1804-1806. The byway follows old travel routes used by the military and Native Americans, passes world-class cultural treasures, provides access to large tracts of public lands, and serves as an economic stimulus to local communities along the three state highways the route covers.

In addition to the National Back Country Byways, approximately 20 state or nationally designated scenic byways, totaling nearly 2,500 miles, traverse BLM lands across seven states. A few of these include the Billy the Kid Trail Scenic Byway in New Mexico, the Rogue-Umpqua National Forest Scenic Byway in Oregon, and the Gold Belt Tour Scenic Byway in Colorado (also a BLM Back Country Byway).

National Scenic Areas: The BLM manages one national scenic area: the Santa Rosa Mountains National Scenic Area in California, which encompasses approximately 101,000 acres. This area was designated by the Secretary of the Interior in 1990 to provide for the conservation, protection, and enhancement of scenic, recreation, and pastoral values. In 2002 this area was also included in the newly designated Santa Rosa/San Jacinto Mountains National Monument (see above).

Lake Todatonten Special Management Area: The U.S. Congress authorized the creation of the Lake Todatonten Special Management Area—a 37,579-acre parcel of public land in Interior Alaska for the protection of fish, wildlife and habitat—in its Omnibus Parks and Public Lands Management Act of 1996 (Public Law 104-333). The area was withdrawn by Public Land Order No. 7372 on December 15, 1998.

Lake Todatonten, the central feature of this special management area, measures 3$^1/_2$ miles long and covers 3,500 acres. This shallow lake is particularly important to waterfowl, which use the area for migration, staging, molting, and nesting. The lake and its surrounding hills are also home to moose, bear, and furbearers.

Residents of four Alaska Native villages near the area are the primary users, since there are no roads to this marshy area. The rural residents hunt, fish, and trap in the area, mostly in the winter, when it can be reached by snowmachine or dog team via the 100-mile Allakaket to Tanana winter trail, which passes near the lake. The Alaska National Interest Lands Conservation Act (ANILCA) of 1981 gave rural residents subsistence preference for natural resources on federally managed lands.

The designation of the special management area included the establishment of a local advisory committee of rural village residents who use the area for subsistence hunting and fishing. The BLM consults with this committee before authorizing new activities in the area. The BLM also works closely with the U.S. Fish and Wildlife Service because the Lake Todatonten Special Management Area is adjacent to the Kanuti National Wildlife Refuge, and many of the waterfowl species use both places for their summer activities.

Herd Management Areas: The Wild Free-Roaming Horse and Burro Act of 1971 requires that wild free-roaming horses and burros be considered for management where they were found at the time Congress passed the Act. The BLM identified 321 areas of use as "herd areas," and then established herd management areas (HMAs) for wild and free-roaming horses and burros through its land use planning process. The BLM currently manages 206 HMAs in ten western states: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, and Wyoming. The current population of wild horses and burros on public lands in these states is 37,186 animals, with about 50 percent of these animals being located in Nevada. Wild burros are primarily found in the Mojave desert in Arizona, California, and southern Nevada. Table 12 shows the location, number, and acreage of herd management areas, as well as the total number of animals, by state.

As the table shows, almost 30 million acres of BLM-managed lands have been designated for wild and free-roaming horses and burros. Through the evaluation of rangeland monitoring and census data for HMAs, the BLM establishes an appropriate management level for wild horses and burros in balance with other rangeland uses. As the health of the land improves, the health of the herds is improving as well.

The BLM has designated three wild horse ranges, one each in Colorado, Montana, and Nevada, and one wild

Table 12 - Herd Management Areas

State	Number of HMAs	Acreage	Total Number of Horses and Burros
Arizona	10	1,900,933	2,613
California	22	2,330,974	4,218
Colorado	4	401,151	620
Idaho	6	382,982	697
Montana	1	28,255	170
Nevada	102	15,827,077	17,930
New Mexico	2	32,701	68
Oregon	20	2,710,560	2,885
Utah	23	2,370,465	2,621
Wyoming	16	3,664,002	5,364
Totals	206	29,649,100	37,186

burro range in Nevada. The Bureau manages these ranges principally, but not necessarily exclusively, for the welfare of wild horses and burros, in keeping with the multiple use management concept for these public lands.

Areas of Critical Environmental Concern: Areas of critical environmental concern (ACECs) are areas where special management is needed to protect important historical, cultural, scenic, and natural areas, or to identify areas hazardous to human life and property. A total of 907 ACECs encompassing almost 13 million acres have been designated on the public lands nationwide. Approximately 7 million acres of this total have been designated to protect their biological resource values. Table 13 shows the location, number, and acres of ACECs, which are designated and protected through the land use planning process.

National Natural Landmarks: The BLM manages 45 national natural landmarks encompassing more than 400,000 acres of public land. These special management areas are of national significance because they represent one of the best-known examples of a natural region's characteristic biotic or geologic features. Table 14 shows the location, number, and acreage of the national natural landmarks managed by the BLM.

National natural landmarks must be located within the boundaries of the United States or on the Continental Shelf and are designated by the Secretary of the Interior. To qualify as a national natural landmark, the area must contain an outstanding representative example(s) of the Nation's natural heritage, including terrestrial communities, aquatic communities, landforms, geological features, habitats of native plant and animal species, or fossil evidence of the development of life on earth.

Research Natural Areas: Research natural areas are special management areas designated either by Congress or by a public or private agency to preserve and protect typical or unusual ecological communities, associations, phenomena, characteristics, or natural features or processes for scientific and educational purposes. They are established and managed to protect ecological processes, conserve biological diversity, and provide opportunities for observation for research and education.

Research natural areas may be designated separately or as a part of other administrative designations such as areas of critical environmental concern. Research proposals and activities may be allowed if they do not interfere with natural processes. These areas may consist of diverse vegetative communities, wildlife habitat, unique geological formations, cultural resource values, and other values identified by physiographic province as outlined in state or agency natural heritage planning documents. The BLM manages 184 research natural areas comprising more than 426,000 acres. Table 15 shows the location, number, and acreage of the research natural areas managed by the BLM.

Table 13 - Areas of Critical Environmental Concern

State	Number of ACECs	Acreage
Alaska	41	4,545,920
Arizona	50	638,110
California	143	1,664,108
Colorado	66	621,589
Eastern States	2	239
Idaho	99	581,667
Montana	43	248,576
Nevada	36	1,356,464
New Mexico	140	572,134
Oregon	190	746,278
Utah	59	1,267,389
Wyoming	38	696,894
Totals	907	12,939,368

Table 14 - National Natural Landmarks

State	Number of National Natural Landmarks	Acreage
Arizona	2	4,398
California	9	76,997
Colorado	2	1,036
Idaho	5	212,640
Montana	3	14,227
Nevada	2	9,600
New Mexico	6	9,927
Oregon	1	600
Utah	3	33,760
Washington	6	6,114
Wyoming	6	48,130
Total	45	417,429

Table 15 - Research Natural Areas

State	Number of RNAs	Acreage
Alaska	14	141,361
Arizona	9	14,056
California	15	43,512
Colorado	10	4,665
Idaho	50	45,181
New Mexico	12	27,852
Oregon	72	143,486
Utah	2	6,453
Totals	184	426,566

Globally Important Bird Areas: Globally important bird areas (IBAs) consist of a network of sites and areas in North America identified and protected to maintain naturally occurring bird populations across the ranges of those species. IBAs are important for maintaining critical habitats and ecosystems. This network of areas encompasses lands critical to the conservation of some bird species and may include the best examples of the species' habitat. IBAs help ensure species' survival.

The BLM manages two IBAs encompassing approximately 56,500 acres: the San Pedro Riparian National Conservation Area in Arizona and the Yaquina Head Outstanding Natural Area in Oregon.

CHANGE IN NATURAL HERITAGE ASSETS FROM 2002 TO 2003

Table 16 provides the net change in natural heritage designations from fiscal year 2002 to fiscal year 2003. The large changes in Areas of Critical Environmental Concern were a result of both additional areas being designated and re-inventorying efforts that had a significant impact on acreage, particularly in Alaska.

Table 16 - Net Change in Natural Heritage Designations

Special Management Area	Number					
	2002 Balance	2003 Increase	2003 Decrease	2003 Net Change	2003 Balance	2002 Balance
National Monuments	15				15	4,806,267
National Conservation and Protection Areas	12	1		+1	13	13,927,708
Cooperative Management and Protection Area	1				1	425,550
White Mountains National Recreation Area	1				1	998,772
Yaquina Head National Outstanding Natural Area	1				1	100
Wilderness Areas	147	14		+14	161	6,254,512
Wilderness Study Areas	601	17	14	+3	604	16,328,238
National Wild and Scenic Rivers	38				38	1,005,652
Headwaters Forest Reserve	1				1	7,400
National Historic Trails	9	1		+1	10	
National Scenic Trails	2				2	
National Recreation Trails	28	1		+1	29	
National Back Country Byways	55	1		+1	56	
Santa Rosa Mountains National Scenic Area	1				1	101,000
Lake Todatonten Special Management Area	1				1	37,579
Herd Management Areas	208		2	-2	206	29,732,585
Areas of Critical Environmental Concern	852	66	11	+55	907	13,989,373
National Natural Landmarks	45				45	417,429
Research Natural Areas	152	43	11	+32	184	347,214
Globally Important Bird Areas	2				2	56,500

Grace Iverson, BLM volunteer, draws a scrub jay in for a photo. South Florida's Jupiter Inlet Natural Area has provided a safe haven for this federally listed threatened species. (Jerry Sintz, BLM Utah State Office (retired))

Acres				Miles				
2003 Increase	2003 Decrease	2003 Net Change	2003 Balance	2002 Balance	2003 Increase	2003 Decrease	2003 Net Change	2003 Balance
680		+680	4,806,947					
48,438		+48,438	13,976,146					
			425,550					
			998,772					
			100					
398,549	137,774	+260,775	6,515,287					
14,762	776,344	-761,582	15,566,656					
			1,005,652	2,061				2,061
			7,400					
				3,650	913		+913	4,563
				640				640
				426	15		+15	441
				2,972	105	49	+56	3,028
			101,000					
			37,579					
151,961	235,446	-83,485	29,649,100					
924,184	1,974,189	-1,050,005	12,939,368					
			417,429					
99,445	20,093	+79,352	426,566					
			56,500					

Museum Collections

Museum collections under BLM's stewardship consist principally of archaeological, historical, and paleontological materials that are managed to professional standards in compliance with applicable laws, and that are accessible to the public.

- Archaeological and Historical Collections: Millions of museum objects have originated from the BLM's archaeological and historical resources (an estimated 4 to 4.5 million cultural properties on the ground). These span millennia, beginning with very early human occupation sites. Resources include trails, sites, buildings, structures, and objects from past human life and activities that are significant to American history, architecture, archaeology, engineering, and culture, and that contribute to our understanding of the historical and cultural foundations of our Nation. Museum collections have been made under permit from BLM's resources for over 90 years.

- Paleontological Collections: Paleontological materials—the fossilized remains or traces of dinosaurs, extinct plants, mammals, fish, insects, and other organisms from the distant past—are another important source of museum collections that originate from BLM-managed lands. Many of the earliest described and most widely known dinosaurs, such as *Apatosaurus, Stegosaurus,* and *Allosaurus*, were excavated from BLM-managed lands. Public lands continue to yield new fossil finds and exciting discoveries that shed light on the history of life. Fossils of the smallest mammal and one of the largest dinosaurs that ever walked the earth were found on public lands. Paleontologists continue to explore and contribute new information about plants and animals that lived as much as 540 million years ago.

A group of paleontologists meet at one of the BLM's many sites.

Collections are used to teach museum visitors, from all walks of life and ethnic backgrounds, about life in the past. Researchers value the collections from public lands as a source of material for scientific data that becomes a permanent part of study and display collections. Scientific publications, textbooks, and articles for the general public are based on information taken from these collections. Archaeological and paleontological field schools conducted on the public lands serve to educate students and volunteers.

COLLECTIONS IN NON-FEDERAL FACILITIES

Scientific investigations, beginning with the Lewis and Clark expedition in 1804, have been conducted on the vast acreage of Federal land. Millions of objects have been excavated and collected, with most of them being transported to numerous of non-Federal facilities such as universities, museums, and historical societies. It was not until 1906 that permits were issued for excavations under the Antiquities Act and not until the mid-1980s that the BLM was delegated permitting authority.

Most collections originating from BLM-managed land are housed in non-Federal facilities throughout the country. To date, the Bureau has identified 162 professional facilities in 33 states and Canada where millions of objects originating from the public lands reside.

Among Department of the Interior agencies, the BLM has stewardship responsibility for one of the largest number of museum collections in non-Federal facilities. This responsibility stems from requirements that museum collections removed from the public lands be held in public trust in perpetuity.

PARTNERSHIPS WITH NON-FEDERAL CURATION FACILITIES

Most of the collections originating from BLM-managed land are housed in non-Federal facilities, making BLM's relationship with these curatorial facilities crucial to the continued management and protection of these collections. Non-Federal facilities provide access to researchers and scientists, develop public displays utilizing the collections, and, in the eastern United States, make collections of western materials accessible to segments of the population that might not otherwise be able to view such materials. Collections in external repositories thus fulfill their mission and are being curated and fully used for public benefit, all at little or no cost to the American public.

It is only through partnerships with these professional facilities that the Bureau can realize its goal of ensuring that collections are available and accessible to the public. To better accomplish this goal and make the most efficient use of extremely limited funds, partnerships with non-Federal facilities are strengthened through assistance and/or direct funding by individual BLM offices or through the Museum Partnership Program (MPP). This program was created in 1998 and is administered by the National Curator.

Both the MPP and funding by BLM field offices seek to support projects that communicate, consult, and cooperate with museums and universities to conserve invaluable, nonrenewable archaeological, historic, and paleontological collections that originated from the public lands. The BLM provides funding, guidance, and assistance; the non-Federal facilities generally provide expertise and access. These projects support museum collection conservation, as well as enhancing public awareness, offering public education opportunities, providing an enriching experience, and adding to the scientific research potential of collections, through permanent and traveling exhibit production, object conservation, exhibit renewal, finding guides, web pages, catalogs, publications, artifact dating, research, data management, education, and outreach.

Projects that were funded during 2003 under the Museum Partnership Program and BLM field office programs are as follows:

- Museum Partnership Program: In FY 2003, no funding was provided by the Museum Partnership Program to museum collections partners as there was no funding provided to the Program itself.

- BLM Field Office Funding and/or Assistance: In FY 2003, funding and/or assistance was provided by BLM field offices through Assistance Agreements, Cooperative Agreements, Facility Agreements, Memoranda of Understanding, and Purchase Orders. Partners included the University of Alaska Museum, Arizona State Museum, Museum of Northern Arizona, University of Arizona Laboratory of Paleontology, Museum of Western Colorado, University of Colorado Museum, Archaeological Survey of Idaho (Eastern and Western Repositories), Boise State University, Rocky Mountain College, Nevada State Museum, Museum of New Mexico, Maxwell Museum of Anthropology, Oregon State Museum of Anthropology, Southern Oregon University, South Dakota School of Mines, BYU Museum of Peoples and Culture, College of Eastern Utah Prehistoric Museum, Field House of Natural History State Park Museum, Edge of Cedars State Park Museum, Southern Utah University, University of Utah Museum of Natural History, Washington State University, University of Wyoming, Western Wyoming Community College, and Wyoming State Museum.

The BLM has been very active in outreach to its partners via the internet. BLM cultural offices, including the Washington Office, have created interactive web pages to better provide information to our partners in cultural heritage and museum collections. Often these sites are linked to partner museums or universities or feature collections information. The Bureau's sites include:

- *www.blm.gov/heritage/sp.htm*
- *www.az.blm.gov/historic.htm*
- *www.ak.blm.gov/ak930/cultrl.html*
- *www.ca.blm.gov/pa/arch_cult/rockart.html*
- *www.co.blm.gov/ahc/index.htm*
- *www.mt.blm.gov/bcc/index.html*
- *www.nm.blm.gov/nmso/cultural/cultural_splash.html*
- *www.nm.blm.gov/features/blm_paleo/blm_paleo.html*
- *www.nm.blm.gov/features/dinetah/dinetah_splash.html*
- *www.nv.blm.gov/cultural/cultural.htm*
- *www.or.blm.gov/salem/html/archaeology/*
- *oregontrail.blm.gov/*
- *www.ut.blm.gov/wh3cultural.html*
- *www.wy.blm.gov/cultural/index.htm*

Website addresses for all 162 of BLM partner facilities that hold collections are located at *www.blm.gov/heritage/sp.htm.* When a partnering collections facility creates and maintains a website, this demonstrates a commitment by the facility to have updated complete contact information; to increase awareness by the public of the individual facility, its collections, and its programs; to expand the availability of facility collections and expertise to a wider audience; to display a larger portion of the collections to public view; to make facility and collections information more convenient by allowing 24-hour access; to increase its range of services; and to appeal to an audience who might not or could not routinely visit the facility.

COLLECTIONS IN FEDERAL FACILITIES

Outside of the millions of objects residing in non-Federal facilities, the BLM curates over 3.7 million objects in three BLM facilities: the Anasazi Heritage Center (AHC) in Dolores, Colorado, transferred to BLM management in 1988; the Billings Curation Center (BCC) in Billings, Montana, established in 1984; and the National Historic Oregon Trail Interpretive Center (NHOTIC) in Flagstaff Hill, Oregon, opened in 1992. It is the BLM's policy that museum collections will not be housed in the Bureau's field offices.

Anasazi Heritage Center (AHC)

The AHC is the Bureau's only collections facility and museum. It features the Anasazi (ancestral Puebloan) culture as well as other cultures of the Four Corners region. The museum has permanent exhibits, archaeological sites, special exhibits and events, traveling exhibits, educational resources for teachers, archaeological research collections, and an excellent interactive website (*www.co.blm.gov/ahc/index.htm*). In 2003, the Center hosted 25,850 visitors, down from the previous year as the facility was closed December 1, 2002, through February 28, 2003, for the installation of a new environmental control system.

At the close of fiscal year 2003, AHC collections were estimated to consist of approximately 3,195,750 specimens (principally archaeological materials, along with some historic and paleontological materials), as well as 1,897 linear feet of associated records. Presently, collections at AHC occupy an area of approximately 7,580 cubic feet.

Billings Curation Center (BCC)

A much smaller entity, the BCC was established to curate artifacts collected from public lands in Montana and North and South Dakota. The primary objectives of the BCC are to assist these three BLM states in complying with the Native American Graves Protection and Repatriation Act (NAGPRA), and to ensure that collections (which are representative of nearly 12,000 years of prehistory and history in the Northern Plains) and associated records serve scientific researchers, the BLM, and other Federal agency personnel. The center has no gallery spaces, but it does host researchers and interns. This year the interactive website for the center was once again expanded (*www.mt.blm.gov/bcc/*).

At the close of fiscal year 2003, BCC collections were estimated to consist of 542,884 objects (principally archaeological materials, along with some historic materials), as well as approximately 108 linear feet of associated records. Presently, collections at the BCC occupy an area of approximately 2,147 cubic feet. The center is valued as an important research and resource management tool.

National Historic Oregon Trail Interpretive Center (NHOTIC)

The NHOTIC features exhibits, living history areas (including pioneer encampment and mining), a theater, an outdoor amphitheater, interpretive trails, and a picnic area. It provides majestic scenery and unique vistas of the historic ruts of the Oregon Trail. The center's goal is to interpret the story of the Oregon Trail and its impact on western American history. This is achieved, in great part, through the use of artifacts. Artifacts, along with artwork, text, videos, sound effects, and dioramas, present well-rounded, fact-filled exhibits and programs. In 2003, the center hosted 60,200 visitors. The Center also provides research for mail and telephone requests and maintains an excellent interactive website (*oregontrail.blm.gov/*).

At the close of fiscal year 2003, NHOTIC collections were estimated to consist of approximately 1,550 specimens (principally archaeological materials, along with historic materials and some natural history materials), as well as approximately 16 linear feet of associated records. Collections occupy an area of approximately 5,600 cubic feet. The NHOTIC has provided a rewarding and educational experience for its many visitors.

NUMBER OF FACILITIES AND CONDITION OF MUSEUM COLLECTIONS

Table 17 summarizes the number of facilities holding collections from BLM public lands and the condition of these heritage assets.

Table 17 - Number of Facilities and Condition of Museum Collections

Location	Number of Facilities	Condition
Federal Facilities	3	Good
Non-Federal Facilities	162	Unknown [1]

[1] See the Available Condition Data and Summary Condition Assessment sections below for clarification.

Background

The museum collections and the associated records under BLM's stewardship are stored in professional facilities whose mission, among other things, is to preserve them. Generally, museums and facilities preserve museum objects in a manner that is appropriate to the nature of the materials; that protects them from breakage and possible deterioration from diverse temperatures and relative humidity, visible light, ultraviolet radiation, dust, soot, gases, mold, fungus, insects, rodents, and general neglect; that preserves data which may be studied in future analyses; and that protects collections from fire and theft. It is unavoidable that all museum objects will ultimately deteriorate over time with use. The goal of safeguarding museum objects is to preserve them for as long as possible and to manage their condition during their intended use so as not to unduly hasten their deterioration.

Condition Assessment

The condition of museum collections in BLM facilities is good. The three internal facilities have management and accountability policies, procedures, and systems in place (i.e., governance, finance, security, interpretation, outreach, care or "curation," scope of collections, acquisitions, deaccessioning, legal and safety issues, documentation, and risk management).

The BLM has not conducted formal inspections of the 162 non-Federal facilities. While the condition of BLM's museum collections in these facilities is in the strictest sense unknown, these collections are reasonably presumed to be in good condition unless there is proof to the contrary (e.g., breakage, noted deterioration, etc.). All facilities have been contacted and the Bureau has information regarding the name, location, and website of each facility, as well as the year it was established. Additionally, where available and/or applicable, the BLM has been provided with attendance figures, collections type, professional organization membership, academic accreditation, museum accreditation, and Museum Assessment Program participation.

The creation and maintenance of a website is one indication of a facility's commitment to the collections housed there. All repositories holding BLM museum collections either have developed, or are in the process of developing, a website. The non-Federal facilities holding BLM collections, some of which were founded centuries ago, have histories of excellence and have demonstrated a long-standing commitment to their collections. More recently founded repositories were created in response to a need identified by the local community. Three repositories were established in the 18th century, 49 in the 19th century, and 110 in the 20th century. Many collections are housed in facilities that are departments or divisions of universities or colleges. All of the educational institutions housing BLM collections have been accredited, demonstrating a recognized level of quality and excellence.

Sixty-six of the facilities that hold museum collections from BLM-managed lands are accredited by the American Association of Museums (the only organization accrediting museums in the United States) or have participated in the Museum Assessment Program, demonstrating participation in one of the museum field's vehicles for quality assurance and public accountability. Participation in either of these programs is an extremely lengthy and involved process requiring significant time and resources, which excludes participation by many facilities such as very small museums, laboratories, or university departments.

Professional organization membership illustrates the commitment by a facility to fostering best practices, professionalism, ethical standards, communication, public education, cooperation, and fellowship. All of the facilities housing BLM collections, or individual staff members of these facilities, belong to one or more of the numerous professional associations and organizations in the museum/curatorial field.

These non-Federal facilities are professional facilities and, as such, maintain staff and conditions that are consistent with established scientific standards. These facilities are providing curation for all of the collections in their repositories, including BLM collections. The facilities have management and accountability policies, procedures, and systems in place to meet professional standards that guarantee accountability and ensure against damage or loss of materials. Clearly, the BLM does not need to supplant these existing accountability systems.

Archaeological, historical, and paleontological materials have been removed from public lands for over 200 years. Most of these objects have been placed in non-Federal facilities for curation. As previously noted, the BLM collections are located in 162 of these facilities across the United States and Canada.

NET CHANGE IN MUSEUM COLLECTIONS FROM 2002 TO 2003

The number of non-Federal facilities believed to hold BLM collections decreased from 165 to 162 in FY 2003. This was a result of additional research based on responses to a BLM questionnaire discussed below.

Almost all of the museum collections originating from BLM-administered lands are housed in non-Federal facilities that the BLM has only limited control over and limited access to. Due to limited resources, the BLM provides little or no funding to these facilities and can therefore require little of them. The facilities themselves have limited resources and limited information regarding individual numbers of objects added to collections.

It has never been general museum practice to perform annual inventories of museum collections because this is prohibitively costly, provides information that contributes nothing to the educational or research value of the objects, and ultimately damages the very objects we seek to preserve. In an effort to obtain more precise information on this issue, a questionnaire was sent by BLM to all museums believed to hold collections originating from BLM-administered lands. The questionnaire requested information regarding inventories. A total of 95 repositories responded in some way to the BLM questionnaire. Of those, 53 responded to questions regarding collections inventory (not all of the facilities responding had BLM collections):

- 23 had no baseline inventory (the percent inventoried ranged from 0 to 99 percent).
- 2 had an object-by-object inventory (both were small facilities with small collections).
- 28 repositories had inventories but the inventories were based singularly, or on a combination of, lots

(multiple to thousands of items), accession numbers (one to thousands of objects), sites (hundreds to thousands of objects), catalog numbers (single objects), or numbers of boxes (thousands of objects).

The responses to the questionnaire indicate clearly that it is neither a professional practice nor logistically possible to have detailed inventories. Given all of the above factors, it has never been BLM's practice to collect inventory data. However, because there is an increase in collections yearly as a result of the constantly permitted excavations and projects that occur on the public lands, the BLM can reasonably state there has been a net increase in the number of collections at the 162 non-Federal museums.

During fiscal year 2003, the Anasazi Heritage Center recorded an increase of approximately 69,250 specimens and the Billings Curation Center an increase of approximately 13,412 specimens. These increases were a result of transfers of some collections and the acquisition of others. The National Historic Oregon Trail Interpretive Center recorded no increases.

Paleontological and Cultural Heritage Properties

Lands administered by the BLM are some of the most culturally diverse and scientifically important lands managed by any Federal agency. The Bureau is responsible for protecting and preserving paleontological localities and archaeological and historical sites, as well as the museum objects excavated or collected.

The BLM's website, "Cultural Heritage and Fossil Resources and Tribal Consultation on the Public Lands" (*http://www.blm.gov/heritage/*), provides information on BLM paleontological and cultural heritage programs. The website features photographs and text that highlight a number of noteworthy sites across the American West.

PALEONTOLOGICAL PROPERTIES

The BLM manages fossils as a natural heritage resource on the lands it administers under the general guidance of the Federal Land Policy and Management Act (FLPMA) and the National Environmental Policy Act (NEPA). Fossils are managed to promote their use in research, education, and recreation; paleontological localities are an important consideration in developing land use management decisions. More than 200 properties totaling more than 5 million acres, including both NLCS lands and non-NLCS lands (areas of critical environmental concern, research natural areas, and other special management areas), are managed either wholly or in part for paleontological values, or contain paleontological values that may require special management strategies in the future. Significant paleontological resources can also be found on other BLM lands that are estimated to total over 20 million acres. Because of the increasing interest and activity related to fossils over the past three decades, more than 50,000 fossil sites have been documented on BLM-managed lands. The following interpreted localities include many of these sites:

Colorado
- Dinosaur Diamond Byway
- Fruita Paleontology Area
- Garden Park Fossil Area
- Kremmling Cretaceous Ammonite Locality
- Rabbit Valley Trail Through Time

Idaho
- Malm Gulch ACEC

Utah
- Cleveland Lloyd Dinosaur Quarry
- Copper Ridge Sauropod Dinosaur Tracks
- Mill Canyon Dinosaur Trail
- Warner Valley Dinosaur Track Site

Wyoming
- Alcova Pterodactyl Track Site
- Big Cedar Ridge Fossil Plant Area ACEC
- Brown/Howe Dinosaur Area ACEC
- Dry Creek Petrified Tree Environmental Education Area
- Little Mountain ACEC
- Red Gulch Dinosaur Track Site ACEC

Almost all other public lands are accessible to the public for the recreational collection of common invertebrate and plant fossils, as well as limited amounts of petrified wood. However, a BLM permit is required for collecting vertebrate fossils. BLM permits are issued only to qualified paleontologists for scientific research, education, and display or exhibit at a university or museum.

Arizona

The Safford Field Office manages vertebrate fossil sites of late Pliocene age, including the 111 Ranch and Bear Springs Badlands ACECs established because of their rich fossil resources. These properties contain sediments deposited near the beginning of the Ice Age (about 2 to 3 million years ago) and contain mammals such as glyptodonts and capybaras. Over 50 species have been collected from the properties, including mammals, birds, and reptiles. The mammals collected represent one of the best Blancan-aged assemblages in North America. Vertebrate fauna not previously reported from these fossil beds include beaver, tapir, deer, raccoon, skunk, swan, goose, turkey, hawk, box turtle, and mud turtle. Some material collected will likely be the basis for new species. A number of tracks have also been recorded, including those of camels, llamas, mastodons, and a collie-sized three-toed horse.

BLM paleontological inventories continue in southeast Arizona as part of an ongoing project began by the Safford Field Office in FY 1999. The Safford Field Office works in partnership with the Mesa Southwest Museum in Mesa, Arizona; the museum's affiliate, the Southwest Paleontological Society; and the International Wildlife Museum in Tucson to inventory and collect fossils. Over 500 fossils have been collected since the start of this project. In FY 2003 alone about 1,000 acres were surveyed, resulting in 100 fossils being collected and documented, including a very rare glyptodont skull (a giant armadillo-like animal), the first discovered in the state in over 60 years. Fossils from these inventories are on display at the Mesa Southwest Museum and the museum of the Graham County Historical Society in Thatcher, Arizona. Numerous other fossils have been sent to specialists around the United States and Canada for further study.

New Mexico

The long-standing partnership between the BLM and the New Mexico Museum of Natural History and Science (NMMNH&S) continues to provide outstanding curation and display of paleontological specimens from BLM-managed land, as well as educational opportunities for the public. During FY 2003, a total of 302 new localities were added to the NMMNH&S database, of which 150 were on BLM land. Approximately 2,000 acres of BLM land was surveyed under BLM permits.

This year, the NMMNH&S reopened a renovated "Cretaceous Seacoast" hall with real "New Mexico Fossils" that showcased the skull of the "Bisti Beast," the large therapod dinosaur (smaller cousin of *T. rex*) that was airlifted out of the Bisti/De-Na-Zin Wilderness Area in the San Juan Basin. The reopened hall highlights a number of fossil specimens collected from the BLM lands in New Mexico.

Additional collecting by museum staff in Cretaceous outcrops of the San Juan Basin has lead to the rediscovery of an old quarry site visited by the C.H. Sternberg (1920 expedition) within what is now the Fossil Forest Research Natural Area. New material was collected and moved to the museum for preparation. New turtle, crocodile, therapod, and ceratopsian (horned dinosaur) material were recovered from the Bisti/De-Na-Zin Wilderness Area. Microvertebrate fossil locations recently identified are creating a new understanding of mammalian diversity in late Cretaceous time into the Paleocene across the K-T boundary (the Cretaceous-Tertiary interface – about 65 million years ago). Material was also recovered from the Menefee Formation, which until recently, has been a fairly unproductive unit.

Collecting at the Jurassic Peterson Quarry continues; five more plaster-jacketed specimens were removed from the quarry in FY 2003. There are now almost 100 jacketed specimens from this quarry containing various skeletal elements of giant sauropod dinosaurs (quadruped herbivores) such as *Camarasaurus* and *Diplodocus* as well as the large carnivorous dinosaur, *Allosaurus*. These specimens are waiting cleaning, preparation, and analysis. Recovery of freshly exposed articulated sauropod vertebrae is underway in another portion of the quarry. The quarry represents the southernmost exposure of the Jurassic age Morrison Formation and is taking its place on the list of large, productive dinosaur quarries known from Colorado, Montana, South Dakota, Utah, Colorado, and Wyoming of the same age. Material from the quarry is currently being prepared at the Museum's glass-enclosed fossil works, where the public can watch preparation of the bones. The site continues to provide an outdoor classroom for vertebrate paleontology classes from the University of New Mexico and New Mexico Museum of Natural History and Science volunteers and docents.

Additional collection space was dedicated in April 2003 specifically for oversized material like the material collected from the Peterson Quarry. Another Jurassic dinosaur, *Seismosaurus*, which was collected from the Ojito Wilderness Study area in north-central New Mexico, was dramatically displayed at the dedication of the 1800-square-foot building purchased with funds provided through an Assistance Agreement with BLM. Casts of Seismo's head and tail were displayed on rods attached to two museum field vehicles to demonstrate the impressive length of this 110-foot-long beast. The museum is preparing to kick off a capital campaign to raise funds for updating the existing Jurassic Hall. Once completed, the hall will provide a dramatic showcase for the re-created *Seismosaurus* and the material collected from the Peterson Quarry.

Dinosaur bone being prepared for removal from the Peterson dinosaur quarry site near Albuquerque, NM.

In southern New Mexico, a very rare fossil was excavated and collected by the New Mexico Museum of Natural History and Science with the cooperation of the BLM's Las Cruces Field Office. The fossil discovery was of a 2-million-year-old armadillo-like creature named *Glyptotherium arizonae*, which as a group are commonly called glyptodonts. The intact carapace (shell) of the animal, estimated to be about the size of a Volkswagen Beetle, weighed about a ton and would have provided the animal with a considerable protective shield against its predators. As an added bonus, another discovery was unearthed at the same time not far away from this site: an almost complete skull and tusk of a mammoth was located, and collection of that specimen has been completed. These specimens are currently being prepared in the Museum's prep lab for display.

Utah

Recent paleontological work within the Grand Staircase-Escalante National Monument (GSENM) conducted by a team from the University of Utah has yielded abundant new evidence of fossil vertebrates. This project, financially supported by the GSENM, has concentrated on two Upper Cretaceous Formations: the Wahweap and Kaiparowits. Reconnaissance work in the early Campanian Wahweap Formation (about 80 to 90 million years ago), carried out in cooperation with the Utah Geological Survey, has yielded remains of two ceratopsid (horned) dinosaurs, including partial skulls. Discovery of a hadrosaur (duck-billed dinosaur) bonebed led to excavation of numerous disarticulated elements, and remote sensing techniques have been applied in an attempt to locate additional specimens. Other finds include a pachycephalosaur skull dome and osteoderms (bony armor plates) of a giant crocodilian. In the Kaiparowits Formation, discoveries included a new ceratopsid, represented by most of the skull, as well as representative elements from the post cranium. Theropod remains include partial skeletons of at least two taxa: one large-bodied tyrannosaur and one small-bodied maniraptoran (small vicious meat-eaters similar to the small dinosaurs in Jurassic Park III).

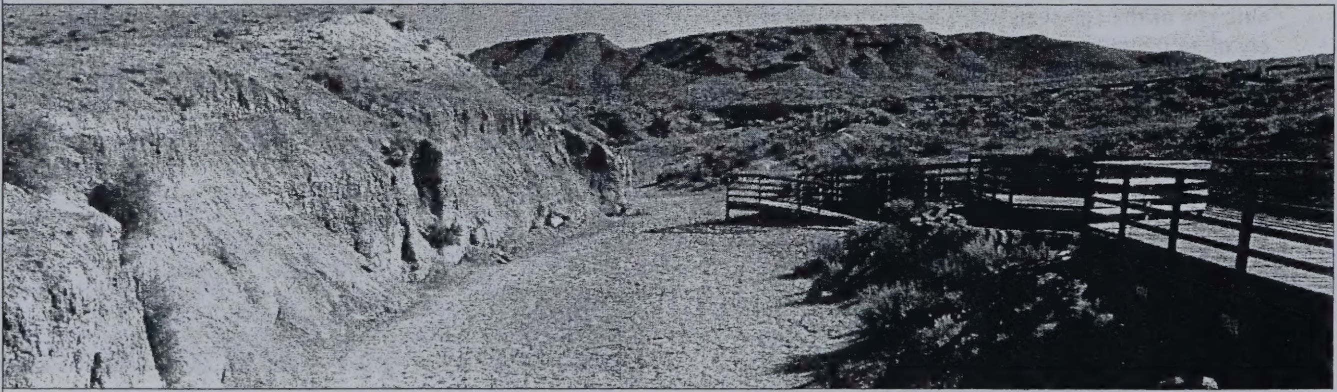
At the Cleveland-Lloyd Dinosaur Quarry, renewed fieldwork and research now show that the 10,000 bones collected there probably accumulated during a long period of drought. Young *Allosaurus* gathered near a drying waterhole and preyed on each other as both food and water ran out. An earlier hypothesis (dinosaurs becoming trapped in mud) was found to have little supporting evidence.

Wyoming

In Wyoming, the Red Gulch Dinosaur Track Site, developed and managed by the Worland Field Office, has become one of the most visited interpreted paleontological sites in the state. Visitors can view hundreds of dinosaur tracks and learn about how they were formed, the dinosaurs that made them, and the environment they lived in. The discovery of this track site has prompted several research efforts on track sites in 2003.

There were 53 different researchers holding 83 active permits working on public lands in Wyoming in FY 2003. In the Big Horn Basin alone, 21 researchers were studying tracks, dinosaurs, and early mammals this year, including excavations of three separate dinosaur bone bed deposits, a locality containing eggshells and juvenile dinosaur bones, and what will probably be a new species of dinosaur when preparation and study are completed. Specimens of *Allosaurus*, *Camarasaurus*, *Triceratops*, *Tyrannosaurus*, and other dinosaurs were excavated, and numerous species of early Tertiary mammals were recovered. A locality containing several specimens of the uncommon *Uintatherium*, an Eocene age (about 50 million years ago) rhino-like mammal, was reported by public lands visitors and excavated by the University of Wyoming in cooperation with the Rawlins Field Office.

The Discovery Channel filmed an excavation on public lands as the first part of their plans to follow a dinosaur specimen from discovery through preparation to final display and research. Cody Field Office staff assisted in this filming project.



The Red Gulch Dinosaur Track Site in Wyoming features hundreds of dinosaur tracks.

CULTURAL PROPERTIES

The BLM manages the largest, most varied, and scientifically most important body of cultural resources of any Federal land managing agency. The public lands managed by the BLM are a grand, open-air museum that contains significant archaeological remains, including defensive structures perched atop narrow escarpments; cliff dwellings set in desolate canyon walls; isolated arrowheads and spear points; mines and stamp mills located above timberline; immense ground figures and rock alignments (intaglios) etched in desert pavement; worn trails from bygone eras; abstract, realistic, and anthropomorphic renderings incised and painted on rock surfaces; abandoned military outposts and homesteads; and so much more. These resources can contribute to our understanding of the origins of civilization in North America, as well as delighting and fascinating anyone who comes upon them, whether they be a curious tourist, an intrepid backcountry adventurer, an accidental visitor, an artist in search of inspiration, or an inquisitive scientist.

The BLM's archaeological and historic resources range in age from 13,000-year-old mammoth kill sites associated with America's earliest hunters to more recent historic sites documenting westward migration, mining, ranching, railroading, and even World War II and Cold War military sites. Because so much of western history was played out on the public lands, the BLM is the only Federal land managing agency that can tell the complete story of people on these western lands. The archaeological and historic resources tell the story of many varied peoples, representing every cultural tradition and ethnicity present in American society. These people include First Americans (ancient cultures and contemporary peoples), as well as immigrant Americans (explorers, miners, ranchers, homesteaders, soldiers, and others). However, because so many of the resources representing these activities have already been intentionally looted or inadvertently disturbed, it will soon be impossible to report anything but anecdotal accounts of this long-playing drama.

Changing land use patterns, increased urbanization, and demographic shifts are transforming public expectations and attitudes about how BLM should manage its public lands, including its cultural resources. Remote areas, once protected by their distance from populated areas, are now within easy reach of the hardy and well-equipped hiker, off-highway vehicle user, or encroaching urban and suburban resident. Increasingly, public land use is concentrated on significant cultural resources such as archaeological resources, rock art panels, emigrant trails, abandoned homesteads, "ghost" towns, and similar places evocative of the American West. These fragile resources are easily and negatively impacted by both natural processes (erosion, natural deterioration, weathering, and arroyo cutting) and human agents (looting, vandalism, recreational activities, and development).

The BLM's cultural resources are important for economic, scientific, recreational, cultural, and educational purposes. Intact, these resources have the capability to tell us when people first arrived on the continent, how they dispersed, how cultures flourished, what led to their demise, how they perceived the spiritual world, how they interacted with other cultural groups, how they exploited and perhaps over-exploited their environment, how they treated their dead, how and why they came into conflict, and much, much more. Answering these questions is important not only to enhance our understanding of the past, but also to aid contemporary society by providing a framework for understanding how previous cultures dealt with similar issues (e.g., water usage) and how past approaches may apply today.

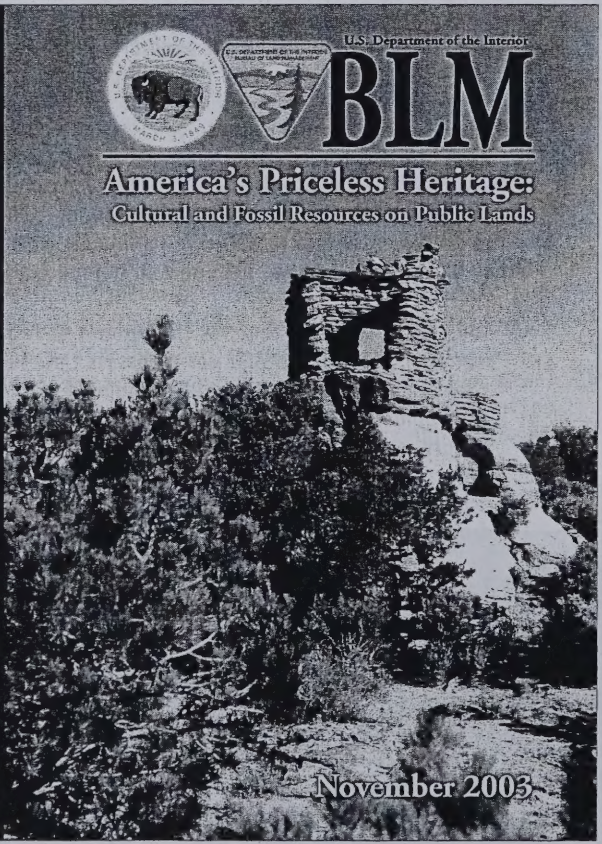
The BLM's cultural resources are important to contemporary Indian and Native Alaskan communities and tribes that draw their spiritual and physical connection to the sites and traditional cultural properties. They are also important to adjacent Western communities who are bound to the public lands either directly or through ancestors and friends who made a living off these lands.

Cultural resources have enormous potential for contributing to the Nation's economic development, primarily through heritage tourism. In recognition of this, on March 3, 2003, President Bush signed Executive Order 13287, *Preserve America*, to actively advance the protection, enhancement, and contemporary use of the cultural resources owned by the Federal government, and to promote intergovernmental cooperation and partnerships for the use of cultural resources. The Preserve America Initiative, of which the Executive Order is a component, is part of a new White House initiative developed in cooperation with the Advisory Council on Historic Preservation and the Departments of Commerce and Interior. The goal of the Preserve America Initiative is to support community efforts to preserve and use cultural and natural resources.

The Executive Order requires the Federal government to manage its historic properties as assets that support agency missions, contribute to community economic development, promote an understanding of our Nation's history, and foster an appreciation of American values. Federal agencies must improve their planning and accountability. Each property-managing agency is required to make a baseline assessment of the status of its inventory of historic properties; the general condition and management needs of its historic properties; steps underway or planned to meet those needs; and the suitability of historic properties to contribute to economic development, including heritage tourism. The Advisory Council on Historic Preservation is currently developing advisory guidelines for agencies to use in completing the assessments and reports required by the Executive Order. These guidelines are being developed in cooperation with an interagency group in which BLM is an active participant. The initial assessment report is due to the Council on September 30, 2004.

The economic benefits of heritage tourism are potentially enormous. However, this potential may never be realized if the most visually appealing and important of these places are destroyed before they can be interpreted. The cultural resources of the West are a strong attraction for visitors from all over the world. The U.S. travel market is experiencing a dramatic growth of heritage tourism, where visitors seek to experience the arts, heritage, and special character of a place. German tourists, in particular, are fascinated with Indians and their past. Many people in Germany grew up reading the Old West novels of Karl May, a nineteenth century author whose tales of Winnetou, an Apache chief, are cult classics. About 60,000 Germans today belong to clubs devoted to Indian tribes and culture. Tourists from Japan, Australia, and Korea are also frequent visitors.

The educational benefits of cultural resources, in both formal and informal settings, are also significant. The BLM's Heritage Education and Project Archaeology programs are playing a key role in supporting existing school curriculums and teaching higher-order thinking skills. The BLM continues to add sections to its cultural website, "Cultural Heritage and Fossil Resources on the Public Lands," (*http://www.blm.gov/heritage/*). In FY 2003, BLM's Heritage Education Program launched *History Mysteries*, a new product aimed at children ages 10-14 designed to stimulate an interest in the historical stories and actual on-the-ground resources associated with public lands. The first *History Mystery* dealt with "The Mystery of Butch Cassidy and the Sundance Kid," and the various sites these historical figures are known to have visited on what eventually came to be public land.


U.S. Department of the Interior
BLM
America's Priceless Heritage:
Cultural and Fossil Resources on Public Lands
November 2003

The cover for America's Priceless Heritage, *which describes the cultural and paleontological resources on BLM-managed public lands.*

The BLM is continuing work on a publication entitled "America's Priceless Heritage." This publication will ultimately consist of 13 booklets, one overarching Bureau booklet and 12 individual state booklets for each State Office. These publications will describe the cultural and paleontological resources found in each state, including their chronology and significance. They will also detail some of the partnerships that are in place to manage cultural resources as well as chronicling the economic benefits of and threats to them.

To date, over 263,000 archaeological and historical resources have been recorded on the roughly 16 million acres of public lands that have been inventoried, which represents six percent of all lands administered by the BLM. Projecting these estimates to the almost 262 million acres of BLM-administered lands works out to an estimated 4 to 4.5 million potential archaeological and historical properties on the public lands.

Currently, the BLM has 293 listings on the National Register of Historic Places that encompass 4,338 contributing properties, as well as 22 national historic landmarks and 5 world heritage properties. Portions of 10 national historic trails covering 4,563 miles cross the public lands. Standing structures, very conservatively estimated at 1,500, include prehistoric pueblos; cliff dwellings; antelope, bighorn sheep, and fish traps; agricultural features; historic-period mining structures (such as smelters, mill sites, arrastras, and charcoal kilns); ranch buildings; adobe forts; stage stops; townsites; lighthouses; cabins; a salt tram; and depression-era schoolhouses.

Five BLM sites having international significance have been added to UNESCO's World Heritage List. UNESCO's world heritage program was established in 1972. Its purpose is to identify outstanding natural and cultural properties and protect them against the threat of damage in a rapidly developing world. To add sites to the World Heritage List, governments of countries where the sites are located submit their applications to the World Heritage Committee.

The 21-member Committee has to evaluate a site's merits according to rules set up by the World Heritage Convention. Factors that must be considered include the following:

- Is the site a unique geological formation like the Grand Canyon?
- Is it an important cultural place like Stonehenge?
- Most importantly, is the site in need of protection and preservation?

There are more than 500 sites on the World Heritage List today. Some sites on the World Heritage List are surprising: the city of Brasilia, the capital of Brazil, for example, which was built 50 years ago, or the Auschwitz Concentration Camp in Poland. Sometimes a place that is worth saving is important not just for how it appears, but also for what it represents.

Five BLM Chacoan Outliers located in northwest New Mexico were added to the World Heritage List in 1987 in conjunction with the listing of the National Park Service's Chaco Culture National Historical Park. The park contains the most important remains of the Chaco culture, which was at its height between 1020 and 1110 A.D. This culture was characterized by a very elaborate system of urban dwellings surrounded by villages and linked by a network of roads. The BLM Chacoan Outliers included in the World Heritage List are Casamero, Kin Nizhoni, Pierre's Site, Halfway House, and Twin Angels.

Table 18 summarizes the number and condition of the cultural properties under BLM's stewardship.

"Adventures in the Past" is BLM's umbrella program for promoting public education and awareness and for encouraging public participation in protecting archaeological and historical resources. The goals of the program include increasing public appreciation and knowledge of archaeological and historical resources, promoting public stewardship of these resources, and reducing the threat to these resources. These goals have their basis in law: "Adventures in the Past" responds to Section 10c of the Archaeological Resources Protection Act. This law requires Federal agencies to develop outreach programs to explain the importance and value of the Nation's cultural legacy, and to enlist the public's assistance in cultural resource protection.

The BLM's national historic preservation program is founded in part on the following policy statements contained in Section 2 of the National Historic Preservation Act: "It shall be the policy of the Federal Government, in cooperation with other nations and in partnership with the states, local governments, Indian Tribes, and private organizations and individuals to . . . administer federally owned, administered, or controlled prehistoric and historic resources in a spirit of stewardship for the inspiration and benefit of present and future generations."

In fiscal year 2003, the BLM completed or continued work on the six *Save America's Treasures* grants totaling $800,000 that were awarded to the BLM between FY 1999 and FY 2001. *Save America's Treasures* is a public/private partnership between the White House Millennium Council and the National Trust for Historic Preservation; all Save America's Treasures grants must be matched dollar for dollar by non-Federal partners. In FY 2001, the BLM's single largest Save America's Treasures grant—$350,000—was awarded to Nevada to restore, preserve, and interpret the cultural and architectural features at two of the remaining cemeteries found within the boundaries of the Virginia City National Historic Landmark; this project is now underway. Previous grants have involved the restoration of the Empire Ranch in Arizona, stabilization and protection of Fort Egbert National Historic Landmark in Alaska, study and stabilization of several mining sites in the San Juan Mining District in southwest Colorado, restoration and curation of collections from southwest Colorado, and preservation and study of perishable prehistoric materials from the Feather Cave Complex in New Mexico.

CONDITION OF CULTURAL PROPERTIES

National Historic Landmarks: The national historic landmarks program is administered by the Secretary of the Interior through the National Park Service (NPS) under the Historic Sites Act of 1935; regulations for the program are in 36 CFR Part 65. Candidate Landmarks are identified by NPS staff, evaluated and recommended by an appointed Advisory Board, and designated by the

Table 18 - Number and Condition of Cultural Properties

Type of Cultural Property	Number of Properties [1]	Condition [2]
Recorded Archaeological and Historic Sites	263,179 [3]	Acceptable
Included in the above:		
National Historic Landmarks	22	Acceptable
National Register of Historic Places	293 Listings (consisting of 4,338 Contributing Properties)	Acceptable
World Heritage Properties	5	Acceptable

[1] The BLM does not use cultural properties in its day-to-day government operations.

[2] Refer to the "Condition of Cultural Properties" section of this report.

[3] This number is a conservative estimate for fiscal year 2003. The number for fiscal year 2002 was 255,252. Thousands of archaeological and historical sites have been recorded on the public lands. Most of these have not been assessed for eligibility for listing on the National Register of Historic Places.

Secretary to recognize their outstanding historical, architectural, or archaeological value and significance at a national level. Landmark designation does not create units of the National Park System.

Many landmarks, particularly in the West, have mixed ownership. Private and other non-Federal landmarks are generally maintained according to owners' agreements with the National Park Service. Maintenance of Federal landmarks and Federal portions of mixed-ownership landmarks is the responsibility of the land-managing agency. Twenty-two national historic landmarks involve BLM-managed lands and, as steward, the Bureau places a high priority on protecting landmarks from deterioration or harm.

Each year the Secretary provides the Congress with a listing of damaged or threatened national historic landmarks, as required by Section 8 of Public Law 94-458. This listing does not differentiate according to ownership when any portion of a landmark is judged to be subject to threat. Of the landmarks identified in the current listing where there are some BLM-managed lands involved, the BLM-managed portions of the landmarks are not actively at risk. Landmark condition is carefully monitored by BLM's field offices. When active threats are present, appropriate physical or administrative protective measures are applied promptly.

Significant cultural properties on BLM-managed public lands, including national historic landmarks, are predominantly archaeological properties that have been unused and unoccupied for hundreds or thousands of years. A smaller percentage of historic properties on the public lands consist of the physical remains of failed settlements, abandoned mines, and similar boom-or-bust developments dating to the past 150 years. Inescapably, such historic resources are in a continuous state of deterioration.

The BLM's cultural resource management program was developed in the 1970s to respond to the National Historic Preservation Act of 1966 and Executive Order 11593 of 1971. The most important known properties, including national historic landmarks, are afforded the highest attention.

The BLM's cultural resource management program does not specifically include an element called "condition assessment survey" since regularly assessing the condition of over 263,000 recorded sites would be an onerous task. However, historic properties are evaluated continuously. In the past two years, the cultural resource management program has worked with the BLM's Protection and Response Staff to obtain funding to conduct condition assessments at specifically threatened historic properties. Monitoring the rate of natural and human-caused deterioration, and adjusting protection methods and priorities accordingly, is the most commonly applied protection measure where significant properties are known to exist.

All Other Cultural Properties: The condition of over 263,000 recorded archaeological and historic sites on the public lands ranges from nonexistent (the site was recorded, assessed, and then destroyed) to excellent. Most of the public lands inventoried in any given fiscal year (500,000 acres on average) are examined in response to requests by land use applicants to undertake a land-disturbing activity. Section 106 of the National Historic Preservation Act requires that any project requiring a Federal approval, license, or money be reviewed for its potential effect on any listed or eligible National Register of Historic Place property. Since less than six percent of the public lands have been inventoried to date and most National Register-eligible sites have not yet been identified, the area of potential impact must generally be inventoried before project approval.

The preferred course of action when a proposed project may affect an archaeological or historic site is to avoid it, particularly if the site is of national significance or is a designated national historic landmark. On some projects, particularly larger ones, it is not always possible to avoid National Register-eligible sites that are important primarily for the scientific information they contain. Consequently, in any given year, the effects of projects on an unknown number of sites are mitigated.

In most instances, mitigation involves either site recordation or excavation of a small percentage of a site. At that point, what remains of the site can be destroyed without further examination. In the years since the National Historic Preservation Act was passed in 1966, many hundreds, if not thousands, of sites have been destroyed subsequent to project mitigation or without mitigation because the information they contain is redundant (i.e., similar information has previously been obtained from similar sites). Consequently, an unknown percentage of the archaeological and historic sites recorded on the public lands no longer exist.

CHANGE IN PALEONTOLOGICAL AND CULTURAL HERITAGE PROPERTIES FROM 2002 TO 2003

During fiscal year 2003, an additional 7,927 archaeological and historical sites were recorded, along with a prior-year adjustment of 27, which represents a total increase of 7,954, or 3.1 percent. The number of National Register of Historic Places listings increased by 16, while the number of contributing properties increased by 132.

Deferred Maintenance (unaudited - see accompanying independent auditors' report)

THE BUREAU OF LAND MANAGEMENT'S CAPITAL ASSETS INCLUDE ADMINISTRATIVE FACILITIES, RECREATION SITES, AND FIRE CONTROL FACILITIES AND BUILDINGS. ROADS, TRAILS, BRIDGES, AND ASSOCIATED IMPROVEMENTS CONSTITUTE THE BLM'S TRANSPORTATION SYSTEM. CURRENTLY, THE BLM MAINTAINS 4,009 BUILDINGS AND STRUCTURES, 687 ADMINISTRATIVE SITES, 2,129 RECREATION SITES, 78,123 MILES OF ROADS, 896 BRIDGES, 15,457 MILES OF TRAILS, AND 732 DAMS. THESE ASSETS SUPPORT THE MANAGEMENT, USE, AND ENJOYMENT OF THE PUBLIC LANDS FOR COMMERCIAL, RECREATIONAL, AND OTHER PURPOSES.

The Bureau's maintenance backlog is estimated to range from $344 million to $732 million. It will take 10 years to erase this backlog at expected funding levels, without any additional projects or adjustments for inflation.

Deferred maintenance is due primarily to insufficient funding over the years for regularly scheduled repairs and preventative maintenance. Meanwhile, the BLM has fallen further and further behind because of escalating maintenance costs and the expansion of the BLM's capital asset base by the Administration and Congress (e.g., new National Monuments and visitor centers).

Field personnel conduct condition assessment surveys on a cyclical basis, according to asset class (e.g., building, road, bridge, etc.). Condition assessments are performed to determine the fitness of the asset as evaluated against the maintenance level established by management. The level of fitness is tabulated in four categories: (1) good, (2) fair, (3) poor, and (4) unsatisfactory.

This year, the BLM began determining an asset's current replacement value as part of the comprehensive baseline condition assessments of administrative and recreation sites. Knowing the replacement value allows the BLM to use the industry standard Facilities Condition Index (FCI) as a method of measuring the condition and change of condition of facilities. FCI is the ratio of accumulated deferred maintenance to the current replacement value (FCI = Deferred Maintenance/Current Replacement Value). It is an indicator of the depleted value of constructed assets. The general rule is that FCI should be below 0.10 for a facility to be considered in good condition. These comprehensive baseline condition assessments are the first of three phases to eventually establish a performance-based annual maintenance management program.

The dollar amount of deferred maintenance is an estimate, since the actual cost of correcting deferred maintenance will not be known until the work is performed. Deferred maintenance costs are estimated by State and field office engineering personnel, with assistance from recreation planners, range conservationists, archaeologists, and other program specialists, using the condition assessment surveys. Assets in a deferred maintenance status are grouped for management and accounting purposes in four categories: (1) administrative sites and buildings, (2) recreation sites and buildings, (3) roads and trails, and (4) dams, bridges, and culverts.

As of September 30, 2003, the total accumulated deferred maintenance was estimated to range from $344 million to $732 million. The first accompanying table shows deferred maintenance by asset category.

A portion of the maintenance backlog has been developed into specific projects and included in the BLM's Five-Year Deferred Maintenance and Capital Improvement Plan. The total deferred maintenance component in the FY 2004–2008 Plan is $223 million, as shown in the second accompanying table by future funding year and subactivity (funding source). The $223 million includes project-specific work, along with project and contract management, condition assessments, information technology, and other work directly related to deferred maintenance.

Estimated Range of Deferred Maintenance as of September 30, 2003

Grouped by Category	General Property, Plant, and Equipment		Stewardship Assets		Totals	
	Low	High	Low	High	Low	High
Administrative Sites and Buildings	$ 83,000,000	$110,000,000	$ 0	$ 0	$ 83,000,000	$ 110,000,000
Recreation Sites and Buildings	62,000,000	77,000,000	0	0	62,000,000	77,000,000
Roads and Trails	0	0	171,000,000	471,000,000	171,000,000	471,000,000
Dams, Bridges, and Major Culverts	0	0	28,000,000	74,000,000	28,000,000	74,000,000
Total	$ 145,000,000	$ 187,000,000	$199,000,000	$545,000,000	$ 334,000,000	$ 732,000,000

Deferred Maintenance by Future Funding Year and Subactivity (Funding Source)*

Funding Source	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	Total
MLR Deferred Maintenance**	$11,100,000	$10,800,000	$11,200,000	$11,500,000	$10,400,000	$ 55,000,000
Infrastructure Improvements	26,200,000	27,100,000	27,400,000	28,400,000	27,300,000	136,400,000
O&C Deferred Maintenance***	1,100,000	1,100,000	1,100,000	1,100,000	1,100,000	5,500,000
Construction	700,000	1,800,000	1,200,000	1,400,000	1,800,000	6,900,000
Wildland Fire****	6,100,000	2,900,000	3,700,000	6,400,000	500,000	19,600,000
Total	$ 45,200,000	$ 43,700,000	$44,600,000	$48,800,000	$41,100,000	$ 223,400,000

[*] This table shows the deferred maintenance that has been developed into specific projects and included in the BLM's Five-Year Deferred Maintenance and Capital Improvement Plan. The $223 million total for FY 2004–2008 includes other costs for project and contract management, condition assessments, information technology, and other work directly related to managing and reducing the maintenance backlog. The table does not include the capital improvement work associated with the projects.

[**] Management of Lands and Resources (MLR) is the major appropriation category in the BLM's annual budget.

[***] Oregon and California Grant Lands (O&C) is a minor appropriation category that covers certain counties in western Oregon.

[****] BLM projects only. The BLM's Five-Year Plan includes Wildland Fire projects for the Bureau of Indian Affairs, Fish and Wildlife Service, and National Park Service because Wildland Fire funding for these bureaus comes through the BLM's appropriations.

PUBLIC LAND STATISTICS

2003

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PART 2

HEALTHY PRODUCTIVE LANDS

Healthy and productive public lands and waters support and sustain natural ecological communities that provide numerous benefits for the American people, including open space, recreational opportunities, wildlife habitat, clean water, clean air, energy and minerals, livestock forage, and other economic, environmental, and social benefits. The BLM's rangelands maintain not only the economies of Western rural communities, but also their history, social fabric, and cultural identity. The BLM mission embodies Interior Secretary Gale Norton's philosophy of the Four Cs: consultation, cooperation, and communication, all in the service of conservation. Through the Four Cs, the BLM continues to sustain the public lands for the use and enjoyment of present and future generations.

To effectively fulfill its mission, the BLM implements sound management practices to (1) assess the conditions and trends of public land resources, (2) identify risks to these resources, (3) restore resources that are in a deteriorated, undesirable condition, and/or (4) maintain resources that are in healthy condition. The BLM works closely with other Federal agencies, American Indian tribes, local and State agencies, constituent groups, other public and private partners, and the general public in developing programs and projects to restore, maintain, protect, and preserve public land resources and their values.

Land resource condition is sometimes defined in Federal and State laws, such as those related to air and water quality. Condition can also be defined in more general terms, requiring subsequent interpretation and the development of measurable standards on a regional basis, such as the BLM's rangeland health standards. Through cooperative conservation projects and other on-the-ground partnership activities, the BLM manages the public lands by balancing resource use with resource protection to achieve long-term public land health and stability and citizen-based stewardship of the public lands.

Table 2-1, Percent of Rangeland Acreage by Ecological Status by State, provides a summary of the ecological site inventories conducted by the BLM over the years. This table is updated annually to reflect new inventory work and changes in the ecological status. Ecological site inventories provide land managers with useful information for determining site capability, and for assessing the implementation of land use plans and achievement of resource management objectives.

Table 2-2, Condition of Riparian-Wetland Areas, was first reported in PLS in 1995. Riparian-wetland areas comprise less than 10 percent of the public lands administered by the BLM. The benefits of these vital oases, however, far exceed their relatively small acreage. In September 1991, the BLM launched its "Riparian-Wetland Initiative for the 1990s," a program to restore and maintain these vital areas in proper functioning condition. A riparian-wetland area is functioning properly when adequate vegetation, land form, or large woody debris is present to dissipate the energy associated with high waterflows.

Table 2-3, Resource Conservation and Improvement Accomplishments, is a summary of the many conservation, rehabilitation, and development projects completed on the BLM public lands during the past year. These projects stabilize soils, maintain or improve water quality, reduce siltation and salinity, reduce surface runoff, and control flooding. They also assist in improving ecologic site condition, promoting healthy riparian areas and wetlands, and enhancing overall watershed health.

Table 2-4, Forest Development Accomplishments in Acres, shows the numerous reforestation and improvement projects completed during Fiscal Year 2003 for restoring forest health conditions on the BLM public lands.

Table 2-5, Types of Wildlife Habitat on Public Lands, describes the various types of wildlife habitats that exist on the BLM public lands. No single Federal or State agency manages more fish and wildlife habitat than the BLM. As the quality and quantity of the fish and wildlife habitats decrease across the country, the varied habitats on the BLM public lands become increasingly important in maintaining the Nation's fish and wildlife heritage.

Table 2-6, Estimated Number of Big Game Animals on Public Lands, shows an estimate of the numbers of big game species located on the BLM public lands. Most of this information is provided by the various State wildlife agencies.

Table 2-7, Fish and Wildlife Habitat Improvements Completed, portrays the variety of improvement projects used to enhance fish and wildlife habitats on public lands over the past year. Habitat quality and quantity are the keys to the future of wildlife. On-the-ground activities to preserve, enhance, or restore wildlife habitat represent a wise investment in the future. Most habitat improvement efforts are accomplished in cooperation with State wildlife agencies, conservation groups, and a variety of other public and private partners.

Table 2-8, Emergency Fire Rehabilitation Projects, displays the BLM's fire rehabilitation projects to stabilize soils and restore watersheds following wildfires. Fire rehabilitation actions are necessary to prevent unacceptable resource degradation, minimize threats to public health and safety, prevent unacceptable off-site damage, and minimize the potential for the recurrence of wildfire. The number and acreage of fire rehabilitation projects vary yearly, depending on the severity of the wildfire season occurring on BLM-managed public lands.

The data for Tables 2-9 and 2-10 is no longer available. Fire and fuels management data is now input by the Department of the Interior into the National Fire Plan Operations and Reporting System. Required fields had to be changed to make the system consistent with the Government Performance and Results Act and the national performance measures we track and report to Congress and others.

Table 2-1. PERCENT OF RANGELAND ACREAGE BY ECOLOGICAL STATUS BY STATE, FISCAL YEAR 2003

		Percent by Ecological Status /a/				
	Percent Acres Inventoried	Potential Natural Community	Late Seral	Mid Seral	Early Seral	Unclassified /b/
Arizona	76	6	32	26	7	30
California	16	3	20	43	30	4
Colorado	58	5	20	30	18	27
Idaho	54	3	27	38	27	5
Montana, North and South Dakota	78	7	58	21	1	13
Nevada	54	3	27	31	8	31
New Mexico	80	4	30	41	22	3
Oregon and Washington	82	1	21	45	11	23
Utah	62	11	28	42	13	6
Wyoming	56	24	34	27	5	10
Total Bureauwide	**61**	**7**	**29**	**34**	**11**	**18**

Note: The first column is the percent of each state that has been inventoried using Ecological Site Inventory (ESI) or the Soil-Vegetation Inventory Method. Ecological Site Inventories are being conducted to fill in data gaps. This table will be updated annually to reflect new data and changes in seral stages.

/a/ Expressed in degree of similarity of present vegetation to the potential natural, or climax, plant community: Potential Natural Community = 76-100% similarity; Late Seral = 51-75% similarity; Mid Seral = 26-50% similarity; Early Seral = 0-25% similarity.

/b/ This category includes rangelands for which neither data nor estimates are available.

Table 2-2. CONDITION OF RIPARIAN-WETLAND AREAS, FISCAL YEAR 2003

Condition of Riparian Areas – Miles /a/

State	Proper Functioning Condition /b/	Functioning-At-Risk /c/				Non-Functional /d/	Unknown /e/	Total
		Trend Up	Trend Not Apparent	Trend Down	Total			
Alaska	107,498 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	59 (0%)	8 (0%)	107,565
Arizona	334 (37%)	180 (20%)	144 (16%)	45 (5%)	369 (41%)	21 (2%)	171 (19%)	895
California	1,090 (42%)	466 (18%)	591 (21%)	94 (4%)	1,151 (43%)	82 (3%)	292 (12%)	2,615
Colorado	2,346 (53%)	484 (11%)	726 (16%)	145 (3%)	1,355 (30%)	689 (16%)	36 (1%)	4,426
Eastern States	5 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5
Idaho	1,963 (50%)	305 (8%)	949 (24%)	151 (4%)	1,405 (36%)	361 (9%)	177 (5%)	3,906
Montana	1,465 (38%)	107 (3%)	1,684 (43%)	53 (1%)	1,844 (48%)	532 (14%)	37 (1%)	3,878
Nevada	854 (33%)	426 (16%)	516 (20%)	290 (11%)	1,232 (47%)	475 (18%)	53 (2%)	2,614
New Mexico	190 (41%)	100 (22%)	79 (17%)	16 (4%)	195 (43%)	57 (12%)	17 (4%)	459
Oregon	1,937 (46%)	1,037 (25%)	731 (17%)	261 (6%)	2,029 (48%)	169 (4%)	53 (0%)	4,188
Utah	3,133 (62%)	352 (7%)	808 (16%)	437 (9%)	1,597 (32%)	326 (6%)	11 (0%)	5,067
Wyoming	1,597 (36%)	952 (21)	861 (19%)	627 (14%)	2,440 (54%)	283 (6%)	158 (4%)	4,478
Total Lower 48	**14,914 (46%)**	**4,409 (14%)**	**7,089 (22%)**	**2,119 (6%)**	**13,617 (42%)**	**2,995 (9%)**	**1,005 (3%)**	**32,531**
Total	**122,412 (87%)**	**4,409 (3%)**	**7,089 (5%)**	**2,119 (2%)**	**13,617 (10%)**	**3,054 (2%)**	**1,013 (1%)**	**140,096**

Table 2-2. CONDITION OF RIPARIAN-WETLAND AREAS, FISCAL YEAR 2003 – continued

Condition of Wetland Areas – Acres /f/

State	Proper Functioning Condition /b/	Functioning-At-Risk /c/				Non-Functional /d/	Unknown /e/	Total
		Trend Up	Trend Not Apparent	Trend Down	Total			
Alaska	12,362,938 (98%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	189,360 (2%)	12,552,298
Arizona	93 (0%)	17,830 (81%)	15 (0%)	96 (0%)	17,941 (82%)	3,027 (14%)	838 (4%)	21,899
California	5,377 (34%)	2,674 (17%)	6,231 (40%)	717 (5%)	9,622 (62%)	328 (2%)	237 (2%)	15,564
Colorado	6,784 (72%)	65 (1%)	755 (8%)	130 (1%)	950 (10%)	10 (0%)	1,734 (18%)	9,478
Eastern States	119 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	119
Idaho	1,409 (40%)	377 (11%)	732 (20%)	201 (6%)	1,310 (37%)	170 (5%)	622 (18%)	3,511
Montana	5,597 (47%)	0 (0%)	2,317 (20%)	20 (0%)	2,337 (20%)	312 (3%)	3,643 (31%)	11,889
Nevada	8,569 (46%)	478 (3%)	1,600 (9%)	777 (4%)	2,855 (15%)	296 (2%)	6,845 (37%)	18,565
New Mexico	910 (25%)	526 (14%)	285 (8%)	202 (5%)	1,013 (28%)	17 (0%)	1,734 (47%)	3,674
Oregon	127,408 (86%)	1,887 (1%)	1,559 (1%)	450 (0%)	3,896 (3%)	462 (0%)	15,937 (11%)	147,703
Utah	8,478 (48%)	3,148 (18%)	1,073 (5%)	457 (3%)	4,678 (26%)	1,498 (9%)	3,057 (17%)	17,711
Wyoming	5,426 (37%)	261 (2%)	4,085 (28%)	2,129 (14%)	6,475 (44%)	351 (2%)	2,564 (17%)	14,816
Total Lower 48	**170,170 (65%)**	**27,246 (10%)**	**18,652 (7%)**	**5,179 (2%)**	**51,077 (19%)**	**6,471 (2%)**	**37,211 (14%)**	**264,929**
Total	**12,533,108 (98%)**	**27,246 (0%)**	**18,652 (0%)**	**5,179 (0%)**	**51,077 (0%)**	**6,471 (0%)**	**226,571 (2%)**	**12,817,227**

Table 2-2. CONDITION OF RIPARIAN-WETLAND AREAS, FISCAL YEAR 2003 – concluded

Note: Percentages are rounded to the nearest whole number, so the total percentage amount does not equal 100 percent.

The BLM's definition of riparian areas excludes stream reaches where water flows for only brief periods during storm runoff events (ephemeral streams). The increase in total riparian miles for Idaho is the result of a publishing error in the previous edition. The increase in wetland acres is the result of advances in mapping technology using remote sensing techniques, the use of various sources of imagery, and the application of Geographic Information Systems (GIS) computer technology. Shifts within category ratings for running water and standing water habitats are a reflection of field offices completing assessments on areas categorized as unknown and implementing management adjustments.

/a/ Riparian areas are green zones along flowing water features such as rivers, streams, and creeks (also referred to as lotic habitat areas), and are reported in miles.

/b/ Riparian and wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to dissipate energy associated with high water flows.

/c/ "Functioning-At-Risk" areas are functioning properly, but an existing soil, water, or vegetation attribute makes them susceptible to degradation. The trend is an assessment of apparent direction of change in conditions either towards or away from the site potential or site stability. Trend is determined by comparing the present condition with previous photos, trend studies, inventories, other documentation, or personal knowledge. The lack of historical information on the condition of a site may lead to a "trend not apparent" assessment.

/d/ "Nonfunctional" areas do not contain sufficient vegetation, landform, or large woody debris to dissipate stream energy associated with high flows.

/e/ "Unknown" areas have not been assessed by the BLM.

/f/ Wetland areas are associated with standing water features such as bogs, marshes, wet meadows, and estuaries (also referred to as lentic habitat areas), and are reported in acres.

Table 2-3. RESOURCE CONSERVATION AND IMPROVEMENT ACCOMPLISHMENTS, FISCAL YEAR 2003

Practice	Units	Arizona	California	Colorado	Idaho	Montana	Nevada	New Mexico	Oregon	Utah	Wyoming	Total
Soil Stabilization & Improvement												
Brush Control	Acres	10,786	186	13,047	7,438	6,093	963	53,686	8,631	130	2,204	**103,164**
Seeding/Planting	Acres	0	1	17,102	7,966	50	6,596	1	56,803	1,336	0	**89,855**
Soil Stabilization	Acres	0	0	13,099	779	0	5,795	0	56,801	1,256	0	**77,730**
Weed Control	Acres	0	0	256	845	2,477	789	22	910	0	310	**5,609**
Water Management												
Detention & Diversion	Quantity	0	1	137	0	3	13	8	0	1	0	**163**
Pipelines -Waters	Quantity	5	2	9	13	79	5	41	3	0	20	**177**
- Length	Miles	5	1	6	5	74	4	52	2	0	11	**160**
Reservoirs	Quantity	0	3	14	1	59	0	7	0	3	5	**92**
Springs	Quantity	0	3	14	6	15	1	14	8	0	8	**69**
Water Catchments	Quantity	1	0	0	0	0	9	19	0	0	0	**29**
	Gallons	60,001	0	0	0	0	9,000	29,580	0	0	0	**98,581**
Wells	Quantity	2	1	4	0	18	0	1	1	0	11	**38**
Storage/Drinking	Quantity	0	0	0	2	1	101	0	1	0	1	**106**
	Gallons	0	0	0	0	250	31,500	0	400	0	15,668	**47,818**
Program Facilities												
Cattleguards	Quantity	5	0	14	11	24	14	6	17	9	2	**102**
Fences	Miles	21	9	26	53	86	84	21	68	6	46	**420**

Source: The Bureau of Land Management's Rangeland Improvement Project System (RIPS); this data was derived from RIPS backups received by November 7, 2003

Table 2-4. FOREST DEVELOPMENT ACCOMPLISHMENTS IN ACRES, FISCAL YEAR 2003

	Reforestation /a/				Stand Productivity /b/	Genetic Tree Improvement /c/		Stand Improvement /d/			Stand Conversion /e/
Administrative State	**Seeding**	**Planting**	**Site Preparation**	**Protection**	**Fertilization**	**Seeded**	**Planted**	**Release**	**Pre-Commercial Thinning**	**Commercial Thinning**	
Alaska	0	0	0	0	0	0	0	0	0	0	0
Arizona	0	0	0	0	0	0	0	0	0	0	0
California	0	175	0	0	0	0	0	0	0	0	175
Colorado	0	0	0	0	0	0	0	0	701	240	0
Idaho	0	140	140	27	0	0	140	0	0	799	187
Montana	0	554	205	280	0	0	0	0	270	53	230
Nevada	0	77	69	31	0	0	0	50	375	218	0
New Mexico	0	0	0	0	0	0	0	912	340	80	0
Oregon	0	5,269	205	2,659	0	0	877	13,843	10,822	6,907	55
- Eastern /f/	0	526	0	411	0	0	0	0	1,325	430	0
- Western /g/	0	4,743	205	2,248	0	0	877	13,843	9,497	6,477	55
Utah	0	0	0	0	0	0	0	121	0	0	0
Wyoming	0	0	128	0	0	0	0	100	57	60	19
Total	**0**	**6,215**	**747**	**2,997**	**0**	**0**	**1,017**	**15,026**	**12,565**	**8,357**	**666**
Group Totals		**9,959 (Reforestation)**						**35,948 (Stand Improvement)**			

Table 2-4. FOREST DEVELOPMENT ACCOMPLISHMENTS IN ACRES, FISCAL YEAR 2003 – concluded

/a/ “Reforestation” is the reestablishment of forest cover, either naturally or artificially.

/b/ “Stand Productivity” improvement is a cultural practice to improve the growth of trees.

/c/ “Genetic Tree Improvement” is the use of genetically improved seeds or plants when doing reforestation.

/d/ “Stand Improvement” is an intermediate treatment made to improve the composition, structure, condition, health, and growth of forest or woodland stands. These treatments could include precommercial thinning, pruning, release, or fertilization.

/e/ “Stand Conversion” is a change from one silvicultural system to another or from one tree species to another.

/f/ Eastern Oregon comprises public lands that include, and extend eastward from, Range 9 East, Willamette Meridian, and public lands in the State of Washington.

/g/ Western Oregon comprises the revested Oregon and California (O&C) lands, the reconveyed Coos Bay Wagon Road lands, and other public lands that include, and extend westward from, Range 8 East, Willamette Meridian.

Table 2-5. TYPES OF WILDLIFE HABITAT ON PUBLIC LANDS, FISCAL YEAR 2003

Administrative State	Lakes	Reservoirs	Fishable Streams
	Acres	*Acres*	*Miles*
Alaska	2,600,000	0	96,424
Arizona	1,164	10,160	160
California	129	65	1,071
Colorado	561	18,149	2,934
Eastern States	0	0	0
Idaho	687	36,924	3,350
Montana	3,500	34,000	1,234
Nevada	24,570	11,300	2,381
New Mexico	21	1,131	278
Oregon	59,375	14,146	3,534
Utah	2,906	24,828	2,644
Wyoming	3,573	33,181	2,475
Total	**2,696,486**	**183,884**	**116,485**

Administrative State	Big Game	Small Game	Waterfowl
	Acres	*Acres*	*Acres*
Alaska	62,243,000	58,522,000	29,430,000
Arizona	13,426,985	13,460,585	32,225
California	1,719,500	2,130,250	9,455
Colorado	8,225,014	8,582,671	55,330
Eastern States	1,557	1,600	3,157
Idaho	9,226,816	11,310,336	80,780
Montana	7,483,000	5,632,098	308,000
Nevada	20,887,867	58,264,529	44,776
New Mexico	11,070,610	12,720,610	22,319
Oregon	9,452,859	8,134,220	92,983
Utah	19,221,912	15,788,040	91,524
Wyoming	18,713,215	18,713,215	86,249
Total	**181,672,335**	**213,260,154**	**30,256,798**

Note: Due to the relatively static nature of the data for habitat acres/miles, this table is updated on a 5-year basis. If a change in data is warranted, a state may change its data prior to the next general scheduled update. The next formal update will be published in 2004.

Table 2-6. ESTIMATED NUMBER OF BIG GAME ANIMALS ON PUBLIC LANDS, FISCAL YEAR 2003

Administrative State	Antelope	Barbary Sheep	Bear	Bighorn Sheep	Buffalo	Caribou
Alaska	0	0	7,600	700 /a/	400	990,000
Arizona	1,260	0	96	3,046	0	0
California	405	0	675	40	0	0
Colorado	13,219	31	2,055	1,830	0	0
Eastern States	0	0	4	0	0	0
Idaho	14,000	0	1,350	2,282	0	0
Montana	90,000	0	600	1,275	0	0
Nevada	11,690	0	0	6,669	0	0
New Mexico	8,635	756	260	165	0	0
Oregon	11,650	50	2,440	1,290	0	0
Utah	11,335	0	422	1,930	350	0
Wyoming	246,501	0	479	1,284	25	0
Total	**408,695**	**837**	**15,981**	**20,511**	**775**	**990,000**

Table 2-6. ESTIMATED NUMBER OF BIG GAME ANIMALS ON PUBLIC LANDS, FISCAL YEAR 2003 – concluded

Administrative State	Deer	Elk	Javelina Wild Boar	Moose	Mountain Goat	Turkey
Alaska	625	0	0	26,500	400	0
Arizona	41,800	129	11,400	0	0	525
California	14,900	670	450	0	0	7,455
Colorado	292,800	91,375	0	38	15	3,435
Eastern States	120	0	0	0	0	40
Montana	91,500	20,700	0	500	285	2,500
Nevada	113,800	3,300	0	0	0	70
New Mexico	28,500	5,715	4,765	0	0	1,230
Oregon	182,110	11,533	0	67	100	12,960
Utah	185,820	27,090	0	77	0	2,560
Wyoming	250,294	73,828	0	3,155	100	1,470
Total	**1,202,269**	**234,340**	**16,615**	**30,337**	**900**	**32,245**

Note: For the purposes of this table, the term "public lands" refers to those lands managed by the BLM. Due to the relatively static nature of the numbers of wildlife on public lands, this table will be updated on a 5-year basis unless a significant change in population numbers is observed, in which case any state may update its information for any year. The next formal update will be in Fiscal Year 2004.

/a/ The sheep numbers for Alaska are for Dall Sheep.

Table 2-7. FISH AND WILDLIFE HABITAT IMPROVEMENTS COMPLETED DURING FISCAL YEAR 2003

Administrative State	Protective Fencing	Spawning Bed Development	Streambank Stabilization	Habitat Disking and Chaining
	Miles	*Miles*	*Miles*	*Acres*
Alaska	0	1	1	0
Arizona	1	0	1	40
California	N/A	N/A	N/A	N/A
Colorado	25	0	5	5,000
Eastern States	0	0	1	0
Idaho	50	0	10	0
Montana	25	1	3	0
Nevada	110	0	10	0
New Mexico	11.5	0	20	2,030
Oregon	0	0	33	0
Utah	12	0	9	0
Wyoming	5	0	24	100
Total	239.5	2	117	7,170

Table 2-7. FISH AND WILDLIFE HABITAT IMPROVEMENTS COMPLETED DURING FISCAL YEAR 2003 – concluded

Administrative State	Lake Improvements	Seeding	Prescribed Burning	Wetland Improvements
	Acres	*Acres*	*Acres*	*Acres*
Alaska	1,800	0	0	0
Arizona	2	35	3,750	20
California	N/A	N/A	N/A	N/A
Colorado	10	10,000	1,000	200
Eastern States	0	7	10	7
Idaho	0	25,000	2,000	0
Montana	75	25	2,500	150
Nevada	0	74,026	3,210	150
New Mexico	5	935	23,374	87
Oregon	0	0	14,538	23
Utah	0	5,276	6,250	130
Wyoming	0	0	10,750	2,115
Total	**1,892**	**115,304**	**67,382**	**2,882**

Note: N/A indicates that a state did not submit information in time for publication.

Table 2-8. EMERGENCY FIRE STABILIZATION AND REHABILITATION PROJECTS, FISCAL YEAR 2003

	Number /a/	Acres Treated /b/	Funding /c/
Arizona	2	340	$ 637,632
California	11	68,612	941,135
Colorado	7	41,995	656,279
Idaho	51	376,519	1,675,259
Montana	4	20,284	345,245
Nevada	111	765,503	2,883,547
New Mexico	1	641	132,404
Oregon	46	705,851	7,258,853
South Dakota	1	1,994	126,347
Utah	54	228,441	5,537,661
Washington	2	304	87,854
Wyoming	6	74,350	373,572
Total	**296**	**2,284,834**	**$20,655,788**

/a/ The number of projects equals the number of approved Emergency Stabilization and Rehabilitation (ESR/BAER) Plans.

/b/ Includes the acres of rehabilitation treatments applied; acres of weed inventory, treatments, and treatments evaluated; and acres of treatments monitored. (Note: Some of these activities may occur on the same acreage).

/c/ Includes expenditures in Fiscal Year 2003 for treatments, monitoring, and inventory; these may include funding for treatments approved in 2000, 2001, and 2002. Does not include planning, indirect support costs, or funds expended in the Native Plant Materials Program.

BUREAU OF LAND MANAGEMENT
RESOURCE MONITORING EFFECTIVENESS (by subactivity)

$(000)

RESOURCE MONITORING ACTIVITY	SPECIES POPULATIONS MONITORED	RANGELAND HEALTH EVALUATIONS	GRAZING ALLOTMENTS MONITORED	TERRESTRIAL HABITAT MONITORED	STREAM/RIPARIAN MONITORING	WILDERNESS & WSAS MONITORED	WATER RESOURCES MONITORING	WEED TREATMENTS EVALUATED	FOREST/WOODLAND TREATMENTS MONITORED	WILD & SCENIC RIVERS & WILD AND SCENIC TRAILS EVALUATED	HERD MANAGEMENT AREAS (HMA) MONITORED	MONITOR HAZARDOUS FUEL REDUCTION TREATMENTS	WILD HORSE & BURRO CENSUS	MONITOR FIRE REHABILITATION TREATMENTS	LAKE & WETLAND MONITORING	NON106 CULTURAL & PALEONTOLOGICAL MONITORING	AIR RESOURCE & CLIMATOLOGICAL MONITORING & EVALUATION	SHRUB & GRASSLAND VEGETATION TREATMENTS EVALUATED	LINEAR RECREATION OBJECTIVES MONITORED	Grand Total
MANAGEMENT OF LANDS & RESOURCES																				
LAND RESOURCES	$491	$6,018	$5,355	$143	$2,139	$58	$1,301	$1,033	$149	$85	$642	$5	$281	$8	$531	$462	$310	$101	$26	$19,138
WILDLIFE AND FISHERIES	$2,946	$157	$77	$1,780	$883	$7	$156	$6	$8	$6	$4	$1	$9	$1	$168	$3	$3	$60	$2	$6,276
T&E SPECIES	$2,370	$75	$58	$1,039	$239	$10	$21	$4	$5	$5		$1			$75			$96		$3,997
RECREATION MANAGEMENT	$29	$15	$21	$3	$27	$2,933	$5	$7	$14	$638	$3		$5			$7	$3	$2	$163	$3,874
RECREATION FEE DEMO PROJECTS						$34				$10									$1	$45
ENERGY & MINERALS	$24	$11	$12	$8	$2	$3	$133	$4	$1						$5		$129			$331
REALTY & OWNERSHIP	$5	$1			$4	$3		$1		$1					$6	$2				$21
COMM SITE FEE EXPENSES			$3			$1														$4
RESOURCE PROTECTION & MAINTENANCE	$127	$14	$37	$81	$22	$9	$33	$1	$2	$1					$1				$2	$330
TRANS. & FACILITIES	$9	$33	$1	$	$56	$4	$7			$17						$2			$2	$132
CHALLENGE COST SHARE	$1,735	$3	$28	$369	$51	$16	$41	$13							$47	$88		$43	$37	$2,471
GRSHPER & MORMON CRICKET	$1																			$1
WORKFORCE & ORGAN. SUPPORT				$1	$1	$3														$4
MINING LAW ADMIN	$69	$1	$10	$13	$383	$	$1		$1	$7			$1				$11	$1		$497
SUBTOTAL MLR	$7,805	$6,328	$5,602	$3,436	$3,805	$3,081	$1,697	$1,068	$181	$769	$649	$7	$295	$9	$832	$564	$455	$303	$233	$37,120
FIRE	$70	$13	$7	$111	$2	$3	$4	$65	$21	$3		$666	$1	$1,089		$3	$27	$9		$2,094
PERMANENT OPERATING FUNDS	$121		$4	$6	$32	$18	$1	$1	$89						$21					$294
O&C FACILITIES MAINTENANCE								$5												$5
O&C RESOURCES	$1,782	$56	$200	$318	$660	$21	$343	$57	$513	$79		$5	$33		$33	$7	$4	$2	$1	$4,113
JOBS IN THE WOODS	$48		$2		$44				$10											$104
TOTAL O&C	$1,830	$56	$201	$318	$704	$21	$343	$62	$523	$79		$5	$33		$33	$7	$4	$2	$1	$4,221
SERVICE CHARGES, DEPOSITS & FORFEITURES	$201			$335	$9	$1	$42	$9	$41	$2			$10		$20		$90	$6	$19	$786
RANGE IMPROVEMENTS								$33												$33
FOREST PEST CONTROL									$4											$4
TOTAL BLM	**$10,027**	**$6,397**	**$5,815**	**$4,206**	**$4,552**	**$3,124**	**$2,087**	**$1,239**	**$858**	**$853**	**$649**	**$678**	**$339**	**$1,098**	**$906**	**$574**	**$577**	**$319**	**$253**	**$44,551**

Attachment 2

BLM's Expenditures for Resource Monitoring

Program Elements	2003 Direct Program Cost ($000's)	Types of Monitoring Activities Conducted by the BLM
Total	$102,268	Fiscal Year 2003 monitoring expenditures derived from the BLM's MIS.
Effectiveness Monitoring		
Species Population Monitored	$10,027	Species population monitored includes all labor and operating costs associated with documenting population status and trend.
Rangeland Health Evaluations	$6,397	Land health evaluations and determinations includes: 1. Conducting an interdisciplinary review of all available data and information to evaluate land health standards and achievement of land use plan objectives in an allotment. 2. Conducting public participation in an allotment evaluation process. 3. Preparing the allotment evaluation report. 4. Evaluating data (including allotment evaluations) to assess achievement of rangeland health standards and conformance with the guidelines for grazing management. 5. Preparing the document that answers the following questions relative to land health standards: (i) is the standard being met? (ii) is significant progress being made? (iii) is livestock grazing a significant factor in failing to achieve the standards and conforming with the guidelines? 6. Global Information System (GIS) support, data management support, contracts/interagency agreements, equipment purchase/lease/rental.
Grazing Allotments Monitored	$5,815	Allotment monitoring relates specifically to data collection needed to analyze the effectiveness of management practices, restoration measures, or project/treatments in achieving and/or measuring movement toward land use objectives and/or rangeland health standards. It includes any form of reoccurring data collection that will assist in characterizing the allotment, such as vegetation production, utilization, use pattern mapping, and actual use. Grazing allotments monitored includes all costs associated with allotment monitoring, including planning for the monitoring, data gathering, labor in the Field Office, GIS support, data management support, contracts/interagency agreements, and equipment purchase/lease/rental.
Terrestrial Habitat Monitored	$4,206	Terrestrial habitats monitored includes all labor and operating costs associated with documenting habitat conditions for plant and botanical resources. This work includes the collection, evaluation, and reporting of terrestrial wildlife and plant habitat (including Special Status Species) information needed to determine if management decisions have been implemented and objectives are being met. It includes implementation, effectiveness, and validation monitoring components. Terrestrial and botanical/plant habitat monitoring is based on species habitat parameters that is directly relevant to a species of interest.
Streams/ Riparian Monitoring	$4,552	Streams/riparian monitoring includes all labor and operating costs associated with documenting habitat conditions for stream and river aquatic species. This work includes the collection, evaluation and reporting of information on streams and river habitat (including Special Status Species) needed to determine if management decisions have been implemented and objectives are being met. It includes implementation, effectiveness, and validation monitoring components. Monitoring is separate from information collected as part of recurring or ongoing inventory programs. Habitat monitoring is typically based on species habitat parameters and is directly relevant to a species of interest. Riparian re-assessment for Proper Functioning Condition is included.

Program Elements	2003 Direct Program Cost ($000's)	Types of Monitoring Activities Conducted by the BLM
Wilderness and Wilderness Study Areas Monitored	$3,124	Number of acres of wilderness and wilderness study areas monitored as reflected by completed monthly reports in the official file. May also be achieved on different frequency basis if in accordance with an approved Alternate Surveillance Plan. Monitoring is defined as an actual visit by an authorized Bureau representative to the area to view the area and evaluate the continuing integrity of the wilderness values.
Water Resources Monitoring	$2,087	Monitoring water resources includes collecting data on the quality and quantity of surface water and groundwater. Also includes monitoring of flows, water levels, temperatures, precipitation, turbidity, sediment, pH, or any other water quality constituents. This program element also includes costs associated with measuring changes in stream channel geometry and measuring changes in flood plain characteristics.
Weed Treatments Evaluated	$1,239	Evaluation of the number of invasive weed acres treated to determine effectiveness.
Forest and Woodland Treatments Monitored	$858	Forest and woodland treatments evaluations include reforestation and forest development survey monitoring (determining if Forest Management treatments were carried out as designed), effectiveness monitoring (determining if prescribed treatments achieve desired objectives), and/or validation monitoring (determining if data, requirements, and assumptions are correct or if better ways are needed to meet objectives).
Wild & Scenic Rivers and Wild & Scenic Trails Evaluated	$853	Includes all costs associated with determining whether management objectives and decisions related to wild and scenic rivers and national trails are being achieved. Work includes all monitoring and evaluation of the data to make the determinations. Work can be reported in the absence of a management plan if the monitoring is done pursuant to a decision.
Herd Management Areas (HMA) Monitored	$649	The HMA monitored or inventoried, including those where the primary purpose for a Field visit is the establishment of appropriate management levels. Includes herd and habitat inventory and monitoring in an HMA conducted in accordance with the applicable RMP or Herd Management Area Plan. Documentation should exist in the file to support the monitoring and inventory workload specific to HMA management. The primary purpose of the monitoring should be for horse or burro management, not livestock or wildlife.
Monitor Hazardous Fuel Reduction Treatments	$678	Includes work associated with monitoring and evaluating the short-term effects of fuels management treatments. In this context, treatment includes chemical or mechanical methods, vegetation seeding or revegetation treatments, prescribed fires, wildland fire for resource benefit, or a combination of these treatments. It may also include the monitoring of weed populations or other vegetation populations and evaluating their responses to the fire or treatment.
Wild Horse and Burro Herd Census	$339	Wild horse and burro herd population census.
Monitor Fire Rehabilitation Treatments	$1098	Fire rehabilitation treatment monitoring includes labor and other costs associated with the monitoring and evaluation of Emergency Fire Rehabilitation. This includes monitoring plot establishment, reading studies, analyzing data, and preparing an evaluation report.

Program Elements	2003 Direct Program Cost ($000's)	Types of Monitoring Activities Conducted by the BLM
Lake and Wetland Monitoring	$906	Aquatic and wetland monitoring and evaluation include all labor and operating costs associated with documenting habitat condition for lake/reservoir aquatic species and wetland areas. This work includes the collection, evaluation, and reporting of information on lakes and reservoir habitat (including Special Status Species) needed to determine if management decisions have been implemented and objectives are being met. It includes implementation, effectiveness, and validation monitoring components. Habitat monitoring is typically based on species habitat parameters and is directly relevant to a species of interest. Wetland re-assessment for Proper Functioning Condition is included in this program element.
Non-Section 106 Cultural and Paleontological Monitoring	$574	Non-section 106 cultural and paleontological monitoring includes all labor and procurement costs related to cultural property condition assessment and detecting and deterring looting and vandalism.
Air Resource and Climatological Monitoring and Evaluation	$577	Air resource and climatological monitoring and evaluation include all work associated with air resource and climatological monitoring and evaluation, including planning for, collecting, and evaluating the data. This includes GIS support, equipment, data management, contracts/interagency agreements, and other support.
Shrub and Grassland Vegetation Treatments Evaluated	$319	Shrub and grassland vegetation treatments evaluated includes labor and other costs associated with collecting and evaluating data to determine the effects of the treatment, whether or not objectives were achieved, and cost effectiveness.
Linear Recreation Objectives Monitored	$253	Monitoring linear recreation objectives include rivers (eligible and suitable prior to designation), trails, and byways management objectives that are evaluated in a given year. Costs can include monitoring data collection, data evaluation, permanent documentation, and reporting. Work can be reported in the absence of a management plan if the evaluation is done pursuant to a decision.
SUBTOTAL	**$44,551**	
Implementation Monitoring		
Recreation Areas Evaluated	**$1,523**	Recreation site/area objectives evaluated for Special and Extensive Recreation Management Areas. Recreation sites include fee sites, ACECs (including Natural Areas), caves, Natural and National Historic Landmarks, National Recreation Areas, Watchable Wildlife Areas, or Off-Highway Vehicle use areas. Work and costs include monitoring of on-the-ground actions, evaluation as to whether the management actions taken are meeting the planning objectives, and permanent documentation of findings.
Compliance Monitoring		
Fluid Minerals Compliance Inspections	$16,011	Fluid minerals includes oil and gas and geothermal resources. Compliance inspections are actions conducted after lease operations have been authorized to ensure that operations are conducted in accordance with the regulations, lease terms, Onshore Operating Orders, notices to lessees and permit conditions of approval. Compliance inspections are broken down into six categories: drilling, production, environmental, undesirable events, workovers, and abandonment.

Program Elements	2003 Direct Program Cost ($000's)	Types of Monitoring Activities Conducted by the BLM
Enforcement Actions Investigated	$6,563	Includes costs associated enforcement actions such as public assists, informal dispute resolution, trespass and non-compliance notices, impoundments, injunctive relief, civil assessments, warnings, citations, seizures, arrests, and other investigative work.
Resource/ Property/ Incident/ Violation Reports	$6,557	Resource or property incident or violation reporting includes law enforcement response to reports of violations against public lands and resources. Includes all types of violations associated with crimes against property such as theft, burglary, vandalism, and other direct or potential acts that would threaten or destroy public lands and resources. Included in this definition are patrol activities associated with the protection of Wilderness Areas, Wilderness Study Areas, Areas of Critical Environmental Concern, recreation areas, specific fee collection areas, or other designated special areas.
Public Health and Safety Incident/Violation Reports	$7,009	Public health and safety incident or violation reports include violations of laws and regulations associated with crimes against people, crimes that would be adverse to public health and sanitation, or other violations that would interfere with the public's ability to have a safe and enjoyable visit to the public lands. This would include drug investigations and violations, as well as incidents relating to search and rescue.
Realty/ Geophysical Compliance Inspections	$4,188	Realty/geophysical compliance inspections include performing onsite inspections of various authorized lands actions; writing up compliance reports on whether a project is in compliance, out of compliance, needs to modify authorization, or accommodate existing development and completing management review/approval of compliance report and recommendations.
Compliance Inspections on Grazing Allotments	$4,056	Compliance inspections on livestock grazing allotments to ensure compliance with terms and conditions of a grazing permit or lease. This includes all work involving unauthorized grazing use resolution and settlement.
Surface Management Inspections	$3,294	Surface management inspections includes all actions taken to inspect plans of operations or notices completed under 43 CFR 3809 or concurrences granted for occupancy under 43 CFR 3715 for compliance with the terms of the authorizing document. Includes the writing of inspection reports and case file documentation of inspections and travel time to and from the site inspected. Includes actions taken by non-law enforcement personnel pursuant to notices of noncompliance.
Solid Mineral Inspections and Production Verifications	$1,892	Solid mineral inspections and production verifications involve monitoring actions from authorizations through completion of a project. Inspections also include all work with authorized users to correct operations that violate use stipulations and/or conditions of approval. Production verification includes all actions to collect and analyze data for independent verifications of production reported by a lessee action. Includes all work associated with conducting inspections and production verification on coal leases and other mineral leases. Also includes work related to Indian sand and gravel leasing.
Reservoir Management Drainage	$1,288	Reservoir management and drainage are a process by which the BLM identifies, analyzes, and monitors the geologic, engineering, and economic aspects of Federal oil and gas interests. The oil and gas drainage case resolution work involves reviewing and conducting analyses on each established case to the point where it is retired and/or protective measures are taken.

Program Elements	2003 Direct Program Cost ($000's)	Types of Monitoring Activities Conducted by the BLM
Lands/Timber/ Minerals Trespass and Unauthorized Occupancy Cases	$1,738	Includes all actions taken to process or resolve unauthorized or unlawful uses, including NEPA actions, administrative hearings, and judicial proceedings. Includes work even if a case is not resolved during the reporting period. Used for all reclamation activities such as wildlife or cultural work necessary for closing an unauthorized or illegal operation where a claimant, operator, or other responsible party can be identified. Includes all work associated with cost recovery and determining Potential Responsible Parties (PRPs) except when a Comprehensive Environmental Response, Compensation, and Liability Act violation is confirmed or expected.
Wild Horse and Burro Compliance Checks	$924	Wild horse and burro compliance checks include all labor and operational costs associated with conducting compliance inspections of the terms and conditions agreed to by an adopter by signing the Private Maintenance and Care Agreement. Some animals adopted through a Private Maintenance and Care Agreement receive a compliance field inspection. The BLM personnel, approved volunteers, or other authorized officers perform field inspections prior to titling.
Mineral Materials Inspections and Production Verifications	$988	Mineral materials inspections and verifications involve monitoring actions from authorizations through completion of a project. Inspections also include all work with authorized users to correct operations that violate use stipulations and/or conditions of approval as well as other post-permit actions. This program element includes all work associated with conducting inspections and production verification for mineral material disposals only. Inspection and production verifications shall be conducted consistent with existing manuals, handbooks, and other guidance.
Special Recreation Permits Compliance (SRPs) Commercial & Organization Groups	$1,134	Includes all activity associated with managing, directing, and evaluating the authorization of SRPs for commercial (including vending) and organized group activities and events, as well as competitive events. Work includes general pre- and post-event/activity management, monitoring, evaluation, compliance, and enforcement of the conditions of the permit and any special stipulations. Also includes all procurement and labor expenses associated with the management of SRPs for commercial use (including vending), organized group activities and events, and competitive events, as described in the 1999 SRP training syllabus for Course No. 8300-14. Includes renewal of permits issued in previous fiscal years.
Special Recreation Permits Compliance - Non-Commercial	$0	Includes all activity associated with managing, directing, and evaluating the authorization of special recreation permits for non-commercial special areas. Examples include river permits, and backcountry hiking or camping permits. Work includes general management, monitoring, evaluation, compliance, and enforcement of the conditions of the permit and any special stipulations. Generally, these are permits for individual use of special areas.
Hazmat and NRDAR Sites Monitored	$552	Includes monitoring of hazardous materials sites and oil spills that have been cleaned up or where no further action is proposed.
SUBTOTAL	$56,194	

Inventory FY-2003 EOY

	BA	BC	BE	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BX	BY	BZ	Total
	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	
	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual
1010	0	0	0	0	0	15	21	2,600	819,776	7,345,137	858,487	414,133	0	0	0	274	0	0	0	9,440,443
1020	0	0	0	0	0	38	194	4	0	1,593,292	319,956	4,887,590	8,282,185	0	269	2	0	0		15,083,530
1030	3,852	0		0	0	0	0	0	0	2,000		0	0	238,039		0	0			243,891
1040	0	0	0	0	0	9	6	25	3,525	891,120	0	700	16,614	0	171,247	1,766	0	0		1,085,012
1050	1,000	87,632	0	0	0	3	3	0	0	0	0	0	0	0		0	0	0	0	88,638
1110	0	0	0	0	0	9	8	0	0	0	1,000	3,674,887	2,150	20,000	2,257	45	0			3,700,356
1120	0	0	0	0	0	5	4	80	0	13,000	0	0	20,770		256,254	1,107	0	0		291,220
1150	12	2,000	0	0	0	0	8	0		762,000	0	2,727,368	80	0	7,616	143	0			3,499,227
1210	25,000	0	2,063,212	63	49	7	6	0	0	0	0		22,120		0	0	2,436	1,027	106	2,114,026
1220	7,498,295	0	1,286,100	0	41	10	9	0	0	0	0	0	0			6	0	12,845	1,155	8,798,461
1310	0	0	0	0	0	5	0	178		0		0	0		0	0	4,522		0	4,705
1410		0		3,144	2,443	487											6,690			12,764
1420		0	0	5,309	2,114	533	3,840					0			0		693			12,489
1430	9	0		0	32	84	11		0	0	0	0	0		0	0	31,092	0	0	31,228
1610	0	0	0	0	0	14	37		0	68,579	0	0	0	0	0	33	0	100	0	68,763
1652	72,600	0		0		8	6	0		0	0				0		0	0		72,614
1770	587,299	3,196	0		0	0		12	39,780			81,983	725,519	0	50	7,213		1,066	0	1,446,118
1910				2,723	3,693	0						0					0			6,416
2822		0			0	0				0		0	374,269	0		7				374,276
2823		0			0	1	1			0	24,808	240,049	31,421	335,398	0	0				631,678
2824	0	504			0	1	1	0	0	0	0	390,431	87,383	136,541		0	0	0		614,861
5810				0	26			0		0	0	0		2,170		0	0			2,196
5882	7,000	0								0			35	0	0	5	0	7		7,047
5900					2									19,497		10				19,509
6310	0	245		0	157	36	12	0	0	0	0		0	28,888		0	2,547			31,885
6320		0		0	5	40	39	0		0			40,605	681,851		0	169			722,709
6332	3,436	500	0		0	28	32	0		0			0				297	37	55	4,385
6333		0		40	0	0		819	0	104,152	0		0	11,104	2	768	0			116,885
6334	0	0	0	0	0			0		0	0	0	65,857	11,104	0	80	0			77,041
7121													1,000							1,000
7123									5,000									0		5,000
8100													16,400							16,400
8200													1,500							1,500
9620														2,021						2,021
Total	8,198,503	94,077	3,349,312	11,279	8,562	1,333	4,238	3,718	868,081	10,779,280	1,204,251	12,417,141	9,687,908	1,486,613	437,695	11,459	48,446	15,082	1,316	48,628,294

Criteria and Indicators for Sustainable Rangelands
The First Approximation
June 2003

Criterion 1: Conservation and Maintenance of Soil and Water Resources of Rangelands

Soil-based Indicators

1. Area and percent of rangeland soils with significantly diminished organic matter and/or high carbon:nitrogen (C:N) ratio.
2. Area and extent of rangelands with changes in soil aggregate stability.
3. Assessment of microbial activity in rangeland soils.
4. Area and percent of rangeland with significant change in extent of bare ground.
5. Area and percent of rangeland with accelerated soil erosion by water or wind.

Water-based Indicators

6. Percent of water bodies in rangeland areas with significant changes in natural biotic assemblage composition.
7. Percent of surface water on rangeland areas with significant deterioration of their chemical, physical, and biological properties from acceptable levels.
8. Changes in ground water systems.
9. Changes in the frequency and duration of surface no-flow periods in rangeland streams.
10. Percent of stream length in rangeland catchments in which stream channel geometry significantly deviates from the natural channel geometry.

Criterion 2: Conservation and Maintenance of Plant and Animal Resources on Rangelands

11. Extent of land area in rangeland.
12. Rangeland area by plant community.
13. Number and extent of wetlands.
14. Fragmentation of rangeland and rangeland plant communities.
15. Density of roads and human structures.
16. Integrity in natural fire regimes on rangeland.
17. Extent and condition of riparian systems.
18. Area of infestation and presence/absence of invasive and other nonnative plant species of concern.
19. Number and distribution of species and communities of concern.
20. Population status and geographic range of rangeland-dependent species.

Criterion 3: Maintenance of Productive Capacity on Rangelands

21. Rangeland aboveground biomass.
22. Rangeland annual productivity.
23. Percent of available rangeland grazed by livestock.
24. Number of domestic livestock on rangeland.
25. Presence and density of wildlife functional groups on rangeland.
26. Annual removal of native hay and nonforage plant materials, landscaping materials, edible and medicinal plants, and wood products.

Criterion 4: Maintenance and Enhancement of Multiple Economic and Social Benefits to Current and Future Generations

27. The value of forage harvested from rangeland by livestock.
28. Value of production of non-livestock products produced from rangeland.
29. Number of visitor days by activity and recreational land class.
30. Reported threats to quality of recreation experiences.
31. Value of investments in rangeland, rangeland improvements, and recreation/tourism infrastructure.
32. Rate of return on investment for range livestock enterprises.
33. Number of conservation easements purchased.
34. Expenditures (monetary and in-kind) to restoration activities.
35. The threat or pressure on the integrity of cultural and spiritual resource values.
36. Poverty rate (general).
37. Poverty rate (children).

38. Income inequality.
39. Index of social structure quality.
40. Community satisfaction.
41. Federal transfers by categories (individual, infrastructure, agriculture, etc.).
42. Presence and tenure of natural resource nongovernmental organizations at the local level.
43. Sources of income and level of dependence on livestock production for household income.
44. Employment diversity.
45. Agriculture (ranch/farm) structure.
46. Years of education.
47. Value produced by agriculture and recreation industries as percent of total.
48. Employment, unemployment, under-employment, and discouraged workers by industrial sector.
49. Land tenure, land use, and ownership patterns by size classes.
50. Population pyramid and population change.
51. Income differentials from migration.
52. Length of residence (native, immigrant more than 5 years, less than 5 years).
53. Income by work location vs. residence.
54. Public beliefs, attitudes, and behavioral intentions towards natural resources.

Criterion 5: Legal, Institutional, and Economic Framework for Rangeland Conservation and Sustainable Management

55. *Land Law and Property Rights.* Extent to which laws, regulations, and guidelines clarify property rights and land tenure arrangements, recognize customary and traditional rights of indigenous people, and provide means of resolving property disputes by due process as they relate to the conservation and sustainable management of rangelands.
56. *Institutions and Organizations.* Extent to which governmental agencies, educational institutions, and other for-profit and not-for-profit organizations affect the conservation and sustainable management.
57. *Economic Policies and Practices.* Extent to which economic policies and practices support the conservation and sustainable management of rangelands.
58. *Public Information and Public Participation.* Extent to which laws, regulations, and guidelines, institutions and organizations provide opportunities for: (1) public access to information; and, (2) public participation in the public policy and decision-making process relating to rangelands.
59. *Professional Education and Technical Assistance.* Extent to which laws, regulations, and guidelines, institutions, and organizations provide for professional education and the distribution of technical information and financial assistance related to the conservation and sustainable management of rangelands.
60. *Land Management.* Extent to which land management programs and practices support the conservation and sustainable management of rangelands.
61. *Land Planning, Assessment, and Policy Review.* Nature and extent of periodic range-related planning, assessment, and policy review activities, including planning and coordination between institutions and organizations.
62. *Protection of Special Values.* Extent to which laws, regulations, and guidelines, insti-tutions, and organizations provide for the management of rangelands to conserve special environmental, cultural, social and/or scientific values.
63. *Measuring and Monitoring.* Extent to which agencies, institutions and organizations devote human and financial resources to measuring and monitoring changes in the condition of rangelands.
64. *Research and Development.* Nature and extent of research and development programs that affect the conservation and sustainable management of rangelands.

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CRITERIA AND INDICATORS FOR THE CONSERVATION AND SUSTAINABLE MANAGEMENT OF TEMPERATE AND BOREAL FORESTS

THE MONTREAL PROCESS

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PREFACE

The Working Group on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests ("Montreal Process") was formed in Geneva in June 1994 to advance the development of internationally agreed criteria and indicators for the conservation and sustainable management of temperate and boreal forests at the national level. Participants in the Working Group included Australia, Canada, Chile, China, Japan, the Republic of Korea, Mexico, New Zealand, the Russian Federation and the United States of America, which together represent 90 percent of the world's temperate and boreal forests. Several international organizations, non-governmental organizations and other countries also participated in meetings of the Working Group.

In February 1995 in Santiago, Chile, the above countries endorsed a comprehensive set of criteria and indicators for forest conservation and sustainable management for use by their respective policy-makers. This document presents these criteria and indicators, together with the statement of endorsement known as the "Santiago Declaration".

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"SANTIAGO DECLARATION" -- STATEMENT ON CRITERIA AND INDICATORS FOR THE CONSERVATION AND SUSTAINABLE MANAGEMENT OF TEMPERATE AND BOREAL FORESTS

The Governments of Australia, Canada, Chile, China, Japan, Mexico, New Zealand, the Republic of Korea, the Russian Federation and the United States of America, which are participating in the Working Group on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests ("Montreal Process") and whose countries contain a significant portion of the world's temperate and boreal forests:

Recognizing that the sustainable management of all types of forests, including temperate and boreal forests, is an important step to implementing the Statement of Forest Principles and Agenda 21, adopted by the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro in June 1992, and is relevant to the United Nations conventions on biological diversity, climate change and desertification,

Also recognizing the value of having an internationally accepted understanding of what constitutes sustainable management of temperate and boreal forests, and the value of agreed criteria and indicators for sustainable forest management in advancing such an understanding,

Mindful that the application of agreed criteria and indicators will need to take account of the wide differences among States regarding the characteristics of their forests, including planted and other forests, land ownership, population, economic development, scientific and technological capacity, and social and political structure,

Taking note of other international initiatives regarding the development of criteria and indicators for sustainable forest management,

Affirming their commitment to the conservation and sustainable management of their respective forests, and

Having undertaken substantive discussions to develop agreed criteria and indicators for the conservation and sustainable management of temperate and boreal forests,

Endorse the non-legally binding Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests annexed to this Statement as guidelines for use by their respective policy-makers;

Encourage other States which have temperate and boreal forests to consider the endorsement and use of these criteria and indicators;

Note the ongoing nature of the discussion on these criteria and indicators and the need to update the annex as new technical and scientific information and data become available and assessment capability increases; and

Request the Government of Chile, on behalf of the above States, to present this Statement, together with its annex, to the FAO Meeting of Ministers Responsible for Forestry, to be held in Rome, March 16-17, 1995, and the third session of the United Nations Commission on Sustainable Development, to be held in New York, April 11-28, 1995.

Santiago, Chile
February 3, 1995

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SECTION 1 -- INTRODUCTION

1.0 Forests are essential to the long-term well being of local populations, national economies, and the earth's biosphere as a whole. In adopting the statement of Forest Principles and Chapter 11 of Agenda 21, the 1992 UN Conference on Environment and Development (UNCED) recognized the importance of sustainably managing all types of forests in order to meet the needs of present and future generations.

1.1 The development of criteria and indicators for the conservation and sustainable management of temperate and boreal forests is an important step in implementing the UNCED Forest Principles and Agenda 21, and is relevant to the UN conventions on biodiversity, climate change and desertification. It is also an important step to furthering the joint commitment made by tropical timber consumer countries in January 1994 to maintain, or achieve by the year 2000, the sustainable management of their respective forests.

1.2 The criteria and indicators listed under Sections 3 and 4 apply broadly to temperate and boreal forests. They are intended to provide a common understanding of what is meant by sustainable forest management. They also provide a common framework for describing, assessing and evaluating a country's progress toward sustainability at the national level. They are not intended to assess directly sustainability at the forest management unit level. As such, the criteria and indicators should help provide an international reference for policy-makers in the formulation of national policies and a basis for international cooperation aimed at supporting sustainable forest management. Internationally agreed criteria and indicators could also help clarify ongoing dialogues related to international trade in products from sustainably managed forests.

1.3 The approach to forest management reflected in the criteria and indicators is the management of forests as ecosystems. Taken together, the set of criteria and indicators suggests an implicit definition of the conservation and sustainable management of forest ecosystems at the country level. It is recognized that no single criterion or indicator is alone an indication of sustainability. Rather, individual criteria and indicators should be considered in the context of other criteria and indicators.

1.4 It should be emphasized that an informed, aware and participatory public is indispensable to promoting the sustainable management of forests. In addition to providing a common understanding of what is meant by sustainable forest management in the temperate and boreal region, the criteria and indicators should be useful in improving the quality of information available not only to decision-makers but also to the general public. This in turn should better inform the policy debate at national and international levels.

1.5 Each country is unique in terms of the quantity, quality, characteristics and descriptions of its forests. Countries also differ in terms of forest conditions relative to national population, such as the amount of forest per capita, the amount reforested annually per capita or the annual forest growth per capita. National circumstances further differ with respect to stages of economic development, land ownership patterns, population patterns, forms of social and political organization, and expectations of how forests should contribute or relate to society.

1.6 Given the wide differences in natural and social conditions among countries, the specific application and monitoring of the criteria and indicators, as well as the capacity to apply them, will vary from country to country based on national circumstances. It is anticipated that individual countries would develop specific measurement schemes appropriate to national conditions to address how data would be gathered. Qualitative terms such as "significant" or "low," which are used as indicator descriptors in some cases, would also be defined based on national conditions. Despite these differences, efforts should be made to harmonize the approaches of countries to measuring and reporting on indicators.

1.7 Changes in the status of forests and related conditions over time, and the direction of the change, are relevant to assessing sustainability. Therefore, indicators should be understood to have a temporal dimension. This means they will need to be assessed as trends (e.g., at points in time) or with an historical perspective to establish trends. The monitoring of changes in indicators will be essential to evaluating whether and how progress is being made toward the sustainability of forest management at the national level.

1.8 While it may be desirable to have quantitative indicators that are readily measured or for which measurements already exist, such indicators alone will not be sufficient to indicate the sustainability of forest management. Some important indicators may involve the gathering of new or additional data, a new program of systematic sampling or even basic research. Furthermore, some indicators of a given criterion may not be quantifiable. In cases where there are no reasonable quantitative measures for indicators, qualitative or descriptive indicators are important. These may require subjective judgments as to what constitutes effective, adequate or appropriate national conditions, or trends in conditions, with respect to the indicator.

1.9 Concepts of forest management evolve over time based on scientific knowledge of how forest ecosystems function and respond to human interventions, as well as in response to changing public demands for forest products and services. The criteria and indicators will need to be reviewed and refined on an on-going basis to reflect new research, advances in technology, increased capability to measure indicators, and an improved understanding of what constitutes appropriate indicators of sustainable forest management.

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SECTION 2 -- DEFINITIONS

2.0 Criterion:

A category of conditions or processes by which sustainable forest management may be assessed.

A criterion is characterized by a set of related indicators which are monitored periodically to assess change.

2.1 Indicator:

indicators should be considered in the context of other criteria and indicators.

1.4 It should be emphasized that an informed, aware and participatory public is indispensable to promoting the sustainable management of forests. In addition to providing a common understanding of what is meant by sustainable forest management in the temperate and boreal region, the criteria and indicators should be useful in improving the quality of information available not only to decision-makers but also to the general public. This in turn should better inform the policy debate at national and international levels.

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Biological diversity includes the elements of the diversity of ecosystems, the diversity between species, and genetic diversity in species.

Indicators:

Ecosystem diversity

a. Extent of area by forest type relative to total forest area-(a);[1]
b. Extent of area by forest type and by age class or successional stage-(b);
c. Extent of area by forest type in protected area categories as defined by IUCN[2] or other classification systems-(a);
d. Extent of areas by forest type in protected areas defined by age class or successional stage-(b);
e. Fragmentation of forest types-(b).

Species diversity

a. The number of forest dependent species-(b);
b. The status (threatened, rare, vulnerable, endangered, or extinct) of forest dependent species at risk of not maintaining viable breeding populations, as determined by legislation or scientific assessment-(a).

Genetic diversity

a. Number of forest dependent species that occupy a small portion of their former range-(b);
b. Population levels of representative species from diverse habitats monitored across their range-(b).

3.2 -- Criterion 2: Maintenance of productive capacity of forest ecosystems

Indicators:

A measure (measurement) of an aspect of the criterion.

A quantitative or qualitative variable which can be measured or described and which when observed periodically demonstrates trends.

2.2 Monitoring:

The periodic and systematic measurement and assessment of change of an indicator.

2.3 Forest Type:

A category of forest defined by its vegetation, particularly composition, and/or locality factors, as categorized by each country in a system suitable to its situation.

2.4 Ecosystem:

A dynamic complex of plant, animal, fungal and micro-organism communities and the associated non-living environment with which they interact.

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SECTION 3 -- CRITERIA AND INDICATORS FOR THE CONSERVATION AND SUSTAINABLE MANAGEMENT OF TEMPERATE AND BOREAL FORESTS - CRITERIA 1-6

3.0

The following six criteria and associated indicators characterize the conservation and sustainable management of temperate and boreal forests. They relate specifically to forest conditions, attributes or functions, and to the values or benefits associated with the environmental and socio-economic goods and services that forests provide. The intent or meaning of each criterion is made clear by its respective indicators. No priority or order is implied in the alpha-numeric listing of the criteria and indicators.

3.1 -- Criterion 1: Conservation of biological diversity

Biological diversity includes the elements of the diversity of ecosystems, the diversity between species, and genetic diversity in species.

Indicators:

Ecosystem diversity

a. Extent of area by forest type relative to total forest area-(a);[1]
b. Extent of area by forest type and by age class or successional stage-(b);
c. Extent of area by forest type in protected area categories as defined by IUCN[2] or other classification systems-(a);
d. Extent of areas by forest type in protected areas defined by age class or successional stage-(b);
e. Fragmentation of forest types-(b).

Species diversity

a. The number of forest dependent species-(b);
b. The status (threatened, rare, vulnerable, endangered, or extinct) of forest dependent species at risk of not maintaining viable breeding populations, as determined by legislation or scientific assessment-(a).

Genetic diversity

a. Number of forest dependent species that occupy a small portion of their former range-(b);
b. Population levels of representative species from diverse habitats monitored across their range-(b).

3.2 -- Criterion 2: Maintenance of productive capacity of forest ecosystems

Indicators:

a. Area of forest land and net area of forest land available for timber production-(a);
b. Total growing stock of both merchantable and non-merchantable tree species on forest land available for timber production-(a);
c. The area and growing stock of plantations of native and exotic species-(a);
d. Annual removal of wood products compared to the volume determined to be sustainable-(a);
e. Annual removal of non-timber forest products (e.g. fur bearers, berries, mushrooms, game), compared to the level determined to be sustainable-(b).

3.3 -- Criterion 3: Maintenance of forest ecosystem health and vitality

Indicators:

a. Area and percent of forest affected by processes or agents beyond the range of historic variation, e.g. by insects, disease, competition from exotic species, fire, storm, land clearance, permanent flooding, salinisation, and domestic animals-(b);
b. Area and percent of forest land subjected to levels of specific air pollutants (e.g. sulfates, nitrate, ozone) or ultraviolet B that may cause negative impacts on the forest ecosystem-(b);
c. Area and percent of forest land with diminished biological components indicative of changes in fundamental ecological processes (e.g. soil nutrient cycling, seed dispersion, pollination) and/or ecological continuity (monitoring of functionally important species such as fungi, arboreal epiphytes, nematodes, beetles, wasps, etc.)-(b).

3.4 -- Criterion 4: Conservation and maintenance of soil and water resources

This criterion encompasses the conservation of soil and water resources and the protective and productive functions of forests.

Indicators:

a. Area and percent of forest land with significant soil erosion-(b);
b. Area and percent of forest land managed primarily for protective functions, e.g. watersheds, flood protection, avalanche protection, riparian zones-(a);
c. Percent of stream kilometres in forested catchments in which stream flow and timing has significantly deviated from the historic range of variation-(b);
d. Area and percent of forest land with significantly diminished soil organic matter and/or changes in other soil chemical properties-(b);
e. Area and percent of forest land with significant compaction or change in soil physical properties esulting from human activities-(b);
f. Percent of water bodies in forest areas (e.g. stream kilometres, lake hectares) with significant variance of biological diversity from the historic range of variability-(b);
g. Percent of water bodies in forest areas (e.g. stream kilometres, lake hectares) with significant variation from the historic range of variability in pH, dissolved oxygen, levels of chemicals (electrical conductivity), sedimentation or temperature change-(b);
h. Area and percent of forest land experiencing an accumulation of persistent toxic substances-(b).

3.5 -- Criterion 5: Maintenance of forest contribution to global carbon cycles

Indicators:

a. Total forest ecosystem biomass and carbon pool, and if appropriate, by forest type, age class, and successional stages-(b);
b. Contribution of forest ecosystems to the total global carbon budget, including absorption and release of carbon (standing biomass, coarse woody debris, peat and soil carbon)-(a or b);
c. Contribution of forest products to the global carbon budget-(b).

3.6 -- Criterion 6: Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of societies

Indicators:

Production and consumption

a. Value and volume of wood and wood products production, including value added through downstream processing-(a);
b. Value and quantities of production of non-wood forest products-(b);
c. Supply and consumption of wood and wood products, including consumption per capita-(a);
d. Value of wood and non-wood products production as percentage of GDP-(a or b);
e. Degree of recycling of forest products-(a or b);
f. Supply and consumption/use of non-wood products-(a or b).

Recreation and tourism

a. Area and percent of forest land managed for general recreation and tourism, in relation to the total area of forest land-(a or b);
b. Number and type of facilities available for general recreation and tourism, in relation to population and forest area-(a or b);
c. Number of visitor days attributed to recreation and tourism, in relation to population and forest area-(b).

Investment in the forest sector

a. Value of investment, including investment in forest growing, forest health and management, planted forests, wood processing, recreation and tourism-(a);
b. Level of expenditure on research and development, and education-(b);
c. Extension and use of new and improved technologies-(b);
d. Rates of return on investment-(b).

Cultural, social and spiritual needs and values

a. Area and percent of forest land managed in relation to the total area of forest land to protect the range of cultural, social and spiritual needs and values-(a or b);
b. Non-consumptive use forest values-(b).

Employment and community needs

a. Direct and indirect employment in the forest sector and forest sector employment as a proportion of total employment-(a or b);
b. Average wage rates and injury rates in major employment categories within the forest sector-(a);
c. Viability and adaptability to changing economic conditions, of forest dependent communities, including indigenous communities-(b);
d. Area and percent of forest land used for subsistence purposes-(b).

1: Indicators followed by an "a" are those for which most data are available. Indicators followed by a "b" are those which may require the gathering of new or additional data and/or a new program of systematic sampling or basic research.

2: IUCN categories include: I. Strict protection, II. Ecosystem conservation and tourism, III. Conservation of natural features, IV. Conservation through active management, V. Landscape/Seascape conservation and recreation, VI. Sustainable use of natural ecosystems.

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SECTION 4 -- CRITERIA AND INDICATORS FOR THE CONSERVATION AND SUSTAINABLE MANAGEMENT OF TEMPERATE AND BOREAL FORESTS CRITERION 7

4.0

Criterion 7 and associated indicators relate to the overall policy framework of a country that can facilitate the conservation and sustainable management of forests. Included are the broader societal conditions and processes often external to the forest itself but which may support efforts to conserve, maintain or enhance one or more of the conditions, attributes, functions and benefits captured in criteria 1-6. No priority or order is implied in the listing of the indicators.

4.1 -- Criterion 7: Legal, institutional and economic framework for forest conservation and sustainable management

Indicators:

*Extent to which the **legal framework** (laws, regulations, guidelines) supports the conservation and sustainable management of forests, including the extent to which it:*

a. Clarifies property rights, provides for appropriate land tenure arrangements, recognizes customary and traditional rights of indigenous people, and provides means of resolving property disputes by due process;
b. Provides for periodic forest-related planning, assessment, and policy review that recognizes the range of forest values, including coordination with relevant sectors;
c. Provides opportunities for public participation in public policy and decision-making related to forests and public access to information;
d. Encourages best practice codes for forest management;
e. Provides for the management of forests to conserve special environmental, cultural, social and/or scientific values.

*Extent to which the **institutional framework** supports the conservation and sustainable management of forests, including the capacity to:*

a. Provide for public involvement activities and public education, awareness and extension programs, and make available forest-related information;

b. Undertake and implement periodic forest-related planning, assessment, and policy review including cross-sectoral planning and coordination;
c. Develop and maintain human resource skills across relevant disciplines;
d. Develop and maintain efficient physical infrastructure to facilitate the supply of forest products and services and support forest management;
e. Enforce laws, regulations and guidelines.

*Extent to which the **economic framework** (economic policies and measures) supports the conservation and sustainable management of forests through:*

a. Investment and taxation policies and a regulatory environment which recognize the long-term nature of investments and permit the flow of capital in and out of the forest sector in response to market signals, non-market economic valuations, and public policy decisions in order to meet long-term demands for forest products and services;
b. Non-discriminatory trade policies for forest products.

*Capacity to **measure and monitor** changes in the conservation and sustainable management of forests, including:*

a. Availability and extent of up-to-date data, statistics and other information important to measuring or describing indicators associated with criteria 1-7;
b. Scope, frequency and statistical reliability of forest inventories, assessments, monitoring and other relevant information;
c. Compatibility with other countries in measuring, monitoring and reporting on indicators.

*Capacity to conduct and apply **research and***

development *aimed at improving forest management and delivery of forest goods and services, including:*

a. Development of scientific understanding of forest ecosystem characteristics and functions;
b. Development of methodologies to measure and integrate environmental and social costs and benefits into markets and public policies, and to reflect forest-related resource depletion or replenishment in national accounting systems;
c. New technologies and the capacity to assess the socio-economic consequences associated with the introduction of new technologies;
d. Enhancement of ability to predict impacts of human intervention on forests;
e. Ability to predict impacts on forests of possible climate change.

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Appendix -- Explanatory Notes on Selected Criteria and Indicators

The following explanatory notes provide a further explanation or "rationale" as to what is meant by selected criteria and indicators and why they are considered important to assessing forest conservation and sustainable management. As noted in paragraph 1.3, "no single criterion or indicator is alone an indication of sustainability. Rather, individual criteria and indicators should be considered in the context of other criteria and indicators."

3.1 -- Criterion 1: Conservation of biological diversity

The ultimate objective of the conservation of biological diversity is the survival of species and the genetic variability within those species. Viable breeding populations of species and their natural genetic variation are part of interdependent physical and biological systems or processes - communities or ecosystems. The condition and distribution of forest communities are important to fundamental ecological processes and systems and the future of biological diversity associated with forests.

Ecosystem diversity

a. Ecological processes and viable populations of species that are characteristic of forest ecosystems are usually dependent on a contiguous ecosystem or ecosystems of a certain minimum size. Genetic diversity within a species population depends on the maintenance of subpopulations and the existence of forest ecosystems that cover a large part of their natural range. Forests may constitute all or a part of the habitat necessary to the survival of a species.
b. Ecological processes and the species associated with those processes, within any forest ecosystem or forest type, are associated with vegetative structures (age of the vegetation, its diameter, and height) and successional stages (variable species of vegetation).
c. The amount of a forest ecosystem reserved in some form of protected area is a measure of the priority being placed on maintaining representative areas of that forest ecosystem by society.
d. The fragmentation of a forest type into small pieces may disrupt some ecological processes and availability of habitat. Such fragments of forest may be too small to maintain viable breeding populations of species. Distances between forest fragments can interfere with pollination, seed dispersal, and wildlife movement between patches of forest and breeding.
e. Ultimately, excessive fragmentation can contribute to the loss of plant and animal species that are unable to adapt to these conditions. In areas converted in the past to agricultural purposes, remnant forest fragments of the original forest cover may provide refuges for many, although not all, components of the original diversity.

Species diversity

a. Surveys of species numbers are necessary in order to estimate biological diversity.

b. Ecological processes and the species associated with those processes, within any forest type, may vary according to the extent, condition, or fragmentation of that forest type.

Genetic diversity

a. Forest dependent species with low population levels or significantly reduced range run the risk of losing important genetic traits (alleles) from their gene pools. In the case of species with a dispersed natural range, this can happen at the level of locally adapted subpopulations (provenances), resulting in a reduced ability by species to adapt to environmental changes.
b. Monitoring the population levels of species representative of identified habitats, or ecosystems, across their range provides an indicator of the ability of those habitats to support other species, and subpopulations of those species, dependant on similar habitat.

3.2 -- Criterion 2: Maintenance of productive capacity of forest ecosystem

a. In many countries, traditional calculation of potential production of timber products is based on the forest area available for the production of commercial forest products. In those countries, forest lands are not available for timber harvesting if they do not meet minimal acceptable regeneration standards, minimal acceptable economic growing rates, or accessibility. High spiritual, recreational, scientific, or educational values may also be deemed a higher priority than commodity production. Comparison of net forest land available for timber production to total forest land will provide a measure of the suitability or availability of the forests for commercial forest production to meet society's demands for wood products. In reference to managed forests, some feel this is also an indicator of forest areas whose ecological or genetic character may be different.
b. Measurements of merchantable and non-merchantable growing stock provides an indication of timber supply opportunities.
c. Planted forests can be an important source of forest products and can replace or augment the use of natural forests for the production of wood and non-wood forest products. In other

countries, natural forest management is used as an alternative to planted forests. The area of forest plantations provides one measure of forest management efficiency and reduced future dependence on natural forests for the production of commercial forest products. In addition, some feel this is also an indication of forest areas whose ecological and genetic character may be different. However, many planted forests have been established to reclaim degraded lands where the ecological and genetic character of the original forest had been lost.

d. Monitoring the volume of wood and non-wood forest products annually removed relative to the amount which could be removed sustainably provides an indication of a forest's ability to provide a continuing supply of forest products and economic and forest management opportunities.

3.3 -- Criterion 3: Maintenance of forest ecosystem health and vitality

a. People have multiple effects on forest ecosystems. Human impacts include land conversion, harvesting, species introductions, suppression of natural fire cycles and floods, and the introduction of nonnative species especially pathogens. These in turn influence ecological processes and ultimately forest dependent plant and animal species.
b. Air pollutants are suspected to have a significant cumulative impact on forest ecosystems by affecting regeneration, productivity, and species composition. Correlating forest inventory and health statistics with air pollution data will provide more information on the effects of these pollutants. Increased ultraviolet radiation, caused by changes in the earth's atmosphere, also has been shown to damage plants.
c. The monitoring of forest structure or macro species such as vertebrates (criterion 1) will tend to detect changes in ecological processes decades after they have begun. Monitoring very short-lived species associated with specific ecological processes such as decomposition and nutrient cycling provides a more immediate indication of changes in ecological processes with potential importance to forests.

3.4 -- Criterion 4: Conservation and maintenance of soil and water resources

a. The soil resource is a basic component of all terrestrial ecosystems. The loss of soil will influence the vitality and species composition of forest ecosystems. Extensive areas of soil erosion can have a major effect on aquatic ecosystems associated with forests, recreational opportunities, potable water supplies and the life span of river infrastructure such as dams.

b. This indicator provides a measure of forest land allocated primarily for the protection of valuable environmental amenities associated with clean air, water, soil, flood and avalanche protection, etc. (public health and safety functions).

c. Forests are an important part of the earth's hydrological cycles. They are particularly important in the regulation of surface and ground water flow. Changes in historic stream flow and the timing of flow, resulting in flooding and/or dewatered streams, can reflect on the health of aquatic ecosystems and the management and conservation of associated forest areas and downstream agriculture areas.

d. Soil organic matter is important for water retention, carbon storage, and soil organisms and is an indication of soil nutrient status. Changes in soilorganic matter can affect the vitality of forest ecosystems through diminished regeneration capacity of trees, lower growth rates, and changes inspecies composition.

e. Nutrient and water availability to forest vegetation is dependent on the physical ability of roots to grow and access nutrients, water and oxygen from the soil. This in turn is dependent on soil texture and structure. Subsurface hydrology can also be affected by soil compaction resulting from extensive human activities.

f. This is frequently a measure of benthos populations, e.g. organisms that live at the bottom of water bodies. Benthos fauna are sensitive to a variety of possible changes in aquatic ecosystems such as silt, oxygen levels, and temperature. These changes may be the result of changes in upland forest areas.

g. Monitoring water quality over large areas serves as an initial indication that activities inside or outside a forest area may be affecting ecosystem health.

3.5 -- Criterion 5: Maintenance of forest contribution to global carbon cycles

a. The accumulation of biomass as living vegetation, debris, peat, and soil carbon (carbon pool) is an important forest function in regulating atmospheric carbon. The production rate of biomass is also a measure of forest health and vitality.

b. The ecological and sustainable management of production forests and the long lasting use of forest products can be a factor in controlling the amount of carbon entering the world's atmosphere.

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1	INDICATORS OF LAND HEALTH AND MONITORING TECHNIQUES					
2	12/18/02 - Indicators Team					
3	**Group**	**Indicator**	**Scale**	**Qualitative or Quantitative**	**Technique or Reference**	**Interpretation/Standard**
4	**Air Quality - (Need to discuss how these levels are set. Are they standards or indicators?)**	119) PM-10 of 50ug/m3 annual average; 150 ug/m3 24-hr average (not to be exceeded more than once per year); Montana		QN		
5		120) Particulate Matter; Wyoming				
6		121) Sulfur Dioxide of 0.02 ppm annual average; 0.10 ppm 24-hr average (not to be exceeded more than once per year); 0.50 ppm 1-hr average (not to be exceeded more than 18 times per year); Montana		QN		
7		122) Sulfur Dioxide; Wyoming				
8		123) Carbon Monoxide of 23 ppm hourly average (not to be exceeded more than once per year); 9.0 ppm 8-hr average (not to be exceeded more than once per year); Montana		QN		
9		124) Carbon Monoxide; Wyoming				
10		125) Nitrogen Dioxide of 0.05 ppm annual average; 0.30 ppm hourly average (not to be exceeded more than once per year); Montana		QN		
11		126) Nitrogen Oxides; Wyoming				
12		127) Ozone of 0.10 ppm hourly average (not to be exceeded more than once per year); Montana		QN		
13		128) Photochemical Oxidants (Ozone); Wyoming				
14		129) Lead of 1.5 ug/m3 90 day average; Montana		QN		
15		130) Foliar Fluoride of 35ug/g grazing season average; 50ug/g monthly average; Montana		QN		
16		131) Settled Particulate Matter (dustfall) of 10 mg/m2 30-day average; Montana		QN		
17		132) Hydrogen Sulfide of 0.05 ppm hourly average (not to be exceeded more than once per year); Montana		QN		
18		133) Visibility–Particle scattering coefficient of 3 X 10-5 per meter annual average (Applies to PSD mandatory Class I areas); Montana		QN		
19		134) Visibility; Wyoming				
20		135) Volatile Organic Compounds (Hydrocarbons); Wyoming				
21		136) Odors; Wyoming				

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22	**Composition**	90) Presence of Biological Soil Crusts that Aren't Excessively Fragmented (Where Appropriate)	Local	QL, QN	Interpreting Indicators of Rangeland Health asks for estimate of ground cover by biological crusts; asks for comparison of ground cover of biological crusts between Ecological Reference Area and the Area of Interest; asks for rating of "Soil Surface Resistance to Erosion" indicator, which includes biological crusts; allows for the option of a "Biological Crusts" indicator to be used, although it is not a required indicator	
23		91) Amount & Distribution of Ground Cover, Including Litter, for Identified Ecological Site(s) or Soil-Plant Associations→Appropriate for Site Stability	Local	QN, QL	Interpreting Indicators of Rangeland Health asks for estimates of ground cover for vascular plants, standing dead vegetation, litter, biological crust, rock/gravel, and bare ground; asks for rating of "Litter Movement" indicator, which would be an indicator of litter distribution; asks for rating of "Litter Amount" indicator	
24		92) Bare Ground	Local	QN	Interpreting Indicators of Rangeland Health asks for estimate of ground cover by bare ground	
25		2) Amount, Type (e.g. grass, shrubs, trees), and Distribution of Live Vegetation→Sufficient to Prevent Accelerated Erosion for Ecological Site	Local	QN	Interpreting Indicators of Rangeland Health asks for estimates of canopy cover of grasses, forbs, shrubs, trees, succulents, and biological crust; asks for estimate of ground cover of vascular plants; gives the option to rank dominance of species or life forms, by estimating weight (production); categorizes "Type" of live vegetation into Functional/Structural Groups, and by estimation of cover or weight, the composition of each Group is compared between the Ecological Reference Area and the Area of Interest	
26		4) Diversity of Plant Species (species composition & age class)		QL	Interpreting Indicators of Rangeland Health asks for a description of functional/structural groups and the number of species in each functional group (Indicator 12), and classifies each functional group's dominance in the plant community. An estimate of departure from the Ecological Side Description or Ecological Reference Area is requested.Ecological Site Inventory requires a list of species and composition by weight in the plant community.	
27		7) Presence of Plant Species with a Variety of Rooting Depths; Root Occupancy of Soil Profile	LOCAL	QN	Interpreting Indicators of Rangeland Health categorizes live vegetation into Functional/Structural Groups, and by estimation of cover or weight, the composition of each Group is compared between the Ecological Reference Area and the Area of Interest; asks for rating of "Plant Community Composition and Distribution Relative to Infiltration and Runoff" indicator, which assesses presence of plant species with a variety of rooting depths	

	A	B	C	D	E	G
28		69) Appropriate Amount, Type, & Distribution of Vegetation→ Reflecting the Presence of Desired Plant Community, where Identified in Land Use Plan that Conforms to Healthy Rangeland Standards, or where DPC isn't identified, a Vegetation Community that Equally Sustains the Desired Level of Productivity and Properly Functioning Ecological Processes	local, regional	QL,QN	Interpreting Indicators of Rangeland Health asks for estimates of canopy cover of grasses, forbs, shrubs, trees, succulents, and biological crust; asks for estimate of ground cover of vascular plants; gives the option to rank dominance of species or life forms, by estimating weight (production); categorizes "Type" of live vegetation into Functional/Structural Groups, and by estimation of cover or weight, the composition of each Group is compared between the Ecological Reference Area and the Area of Interest	
29		70) Native Plant Communities (Flora & Microbiotic Crusts) Maintained or Improved→To Ensure Proper Functioning of Ecological Processes and Continued Productivity & Diversity of Native Plant Species	local, regional	QL,QN	Interpreting Indicators of Rangeland Health asks for estimate of ground cover by biological crusts; asks for a ranking of dominance of the Biological Crust Life Form, by estimating cover; allows for the option of a "Biological Crusts" indicator to be used, although it is not a required indicator	
30		98) Vegetation Nutritional Value				
31	**Demography**	4) Diversity of Plant Species (species composition & age class)		QL	Interpreting Indicators of Rangeland Health asks for a description of functional/structural groups and the number of species in each functional group (Indicator 12), and classifies each functional group's dominance in the plant community. An estimate of departure from the Ecological Side Description or Ecological Reference Area is requested.Ecological Site Inventory requires a list of species and composition by weight in the plant community.	
32	**Density**	2) Amount, Type (e.g. grass, shrubs, trees), and Distribution of Live Vegetation→Sufficient to Prevent Accelerated Erosion for Ecological Site	LOCAL ,REGIONAL	QN	Interpreting Indicators of Rangeland Health asks for estimates of canopy cover of grasses, forbs, shrubs, trees, succulents, and biological crust; asks for estimate of ground cover of vascular plants; gives the option to rank dominance of species or life forms, by estimating weight (production); categorizes "Type" of live vegetation into Functional/Structural Groups, and by estimation of cover or weight, the composition of each Group is compared between the Ecological Reference Area and the Area of Interest	
33		10) Greater Vegetation Cover or Density in Upland Swales Compared w/ Adjacent Uplands	local	QN, QL	Density and Cover differences can be determined using sampling sites on both Upland Swales and adjacent uplands. (TR 1730-1, pg 168).	
34	**Diversity**	4) Diversity of Plant Species (species composition & age class)	Local	QN	Interpreting Indicators of Rangeland Health asks for a description of functional/structural groups and the number of species in each functional group (Indicator 12), and classifies each functional group's dominance in the plant community. An estimate of departure from the Ecological Side Description or Ecological Reference Area is requested.Ecological Site Inventory requires a list of species and composition by weight in the plant community.	

	A	B	C	D	E	G
35		5) Community Diversity→Variety & Number of Plant Life-forms (grass, forb, shrub, tree, succulent) Across the Site	,Regional	QN, QL	Interpreting Indicators of Rangeland Health asks for estimates of canopy cover of grasses, forbs, shrubs, trees, succulents, and biological crust; gives the option to rank dominance of life forms, by estimating weight (production); categorizes "Type" of live vegetation into Functional/Structural Groups, and by estimation of cover or weight, the composition of each Group is compared between the Ecological Reference Area and the Area of Interest	
36		6) Community Structure→Plants Exhibit a Good Diversity of Size, Height, Distribution and Age Class that is well Distributed	Local	QN, QL	Interpreting Indicators of Rangeland Health categorizes "Type" of live vegetation into Functional/Structural Groups, and by estimation of cover or weight, the composition/structure of each Group is compared between the Ecological Reference Area and the Area of Interest	
37		67) Successional Stages, Vegetation Structure, & Patch Size→Promotes Diverse & Viable Wildlife Populations	local, regional	QL	Interpreting Indicators of Rangeland Health asks for a rating of a "Functional/Structural Groups" indicator that is an indicator of vegetation structure.	
38		68) Landscapes Composed of Several Plant Communities in a Variety of Successional Stages & Patterns	regional	QL		
39		72) Diversity of Age Classes of Desired Plant Species and Animals→Sufficient to Sustain Recruitment & Mortality Fluctuations	local	QL	Interpreting Indicators of Rangeland Health asks for rating of "Plant Mortality/Decadence" indicator, which can indicate diversity of age classes of desired plant species	
40		73) Diversity & Density of Plant & Animal Species→In Balance with Habitat/Landscape Potential and Exhibit Resilience to Human Activities				
41		76) Diversity of Species, Including Plants, Animals, Insects, Microbes, Is Present	local			
42		75) Frequency, Diversity, Density, Age Classes, & Productivity of Desired Native Species→Necessary to Ensure Reproductive Capability & Survival	local, regional	QN & QL	Interpreting Indicators of Rangeland Health gives the option of ranking dominant (rather than all species) plant species by estimating weight (production); categorizes live vegetation into Functional/Structural Groups, and by estimation of weight (production), the composition of each Group is compared between the Ecological Reference Area and the Area of Interest; asks for rating of "Plant Mortality/Decadence" indicator, which can indicate age classes	
43		106) Number of Perennial Species→Not Diminishing over Time				
44	**Economic**	SRR27. The value of forage harvested from rangeland by livestock.				

	A	B	C	D	E	G
45		SRR28. Value of production of non-livestock products produced from rangeland.				
46		SRR29. Number of visitor days by activity and recreational land class.				
47		SRR30 Reported threats to quality of recreation experiences.				
48		SRR31. Value of investments in rangeland, rangeland improvements, and recreation/tourism infrastructure.				
49		SRR32. Rate of return on investment for range livestock enterprises.				
50		SRR33. Number of conservation easements purchased.				
51		SRR34. Expenditures (monetary and in-kind) to restoration activities.				
52		SRR35. The threat or pressure on the integrity of cultural and spiritual resource values.				
53		SRR36. Poverty rate (general).				
54		SRR37. Poverty rate (children).				
55		SRR38. Income inequality.				
56		SRR43. Sources of income and level of dependence on livestock production for household income.				
57		SRR44. Employment diversity.				
58		SRR47. Value produced by agriculture and recreation industries as percent of total.				
59		SRR48. Employment, unemployment, underemployment, and discouraged workers by industrial sector.				
60		SRR49. Land tenure, land use, and ownership patterns by size class.				
61		SRR51. Income differentials from migration.				
62		SRR53. Income by work location vs. residence.				
63	**Frequency**					
64	**Hydrology**	17) Hydrologic Cycle→Adequate for the Vegetative Communities	local, regional	QL	Interpreting Indicators of Rangeland Health asks for rating of Hydrologic Function based on ratings for 11 hydrologic indicators	
65		22) Flow Pattern/Erosional Flow Patterns→Not Present	local	QL	Interpreting Indicators of Rangeland Health asks for a rating of "Water Flow Patterns" indicator	
66		24) Gullies (including incised channels)→Not Present or Minimal for Soil Type & Landform	local, regional	QL	Interpreting Indicators of Rangeland Health asks for ratings for: rills; water flow patterns; pedestals and/or terracettes; gullies; and wind- scoured, blowouts, and/or deposition areas, which are indicators for soil movement by water and/or wind	

	A	B	C	D	E	G
67		25) Rills→Not Present or Minimal for Soil Type & Landform	LOCAL	QL	Interpreting Indicators of Rangeland Health asks for a rating of "Rills" indicator	
68		26) Plant Pedestaling→Not Present or Minimal for Soil Type & Landform	LOCAL	QL	Interpreting Indicators of Rangeland Health asks for a rating of "Pedestals and/or Terracettes" indicator	
69		SRR8. Changes in ground water systems.				
70	**Invasive Species**	12) Exotic Plants→Absent or Sparse on Site	local or regional	QN, QL	Interpreting Indicators of Rangeland Health asks for a ranking of dominance for a Noxious Weeds category, and for an Invasive Natives category, and for an Invasive Exotics (non-noxious) category, by estimating either cover or weight; asks for a rating of "Invasive Plants" indicator, but this indicator doesn't separate out Exotic from non-Exotic invasives	
71		83) Acceptable Levels of Non-native, Noxious, and Invasive Plant & Animal Species/Noxious Weeds are Not Increasing/Noxious Weeds are Absent or Insignificant in Overall Plant Community	local, regional	QN & QL	Interpreting Indicators of Rangeland Health asks for a ranking of dominance for a Noxious Weeds category, and for an Invasive Natives category, and for an Invasive Exotics (non-noxious) category, by estimating either cover or weight; asks for a rating of "Invasive Plants" indicator	
72		84) Effective Weed Management Program is in Place			(Do we want to include management activities as indicators of rangeland health? See comment above in 71.)	
73		103) Noxious Weeds are Not Increasing		QL	Interpreting Indicators of Rangeland Health asks for rating of "Invasive Plants" indicator, which includes noxious weeds but doesn't separate out noxious weeds from other exotic and non-exotic invasive plants; also the assessment of indicator is not to be used to ascertain trend	
74		105) Noxious Weeds Are Not Increasing		QL	Interpreting Indicators of Rangeland Health asks for rating of "Invasive Plants" indicator, which includes noxious weeds but doesn't separate out noxious weeds from other exotic and non-exotic invasive plants; also the assessment of indicator is not to be used to ascertain trend	
75	**Natural Disturbance Regimes**	23) Soil Movement by Water and Wind→Little Evidence of This		QL	Interpreting Indicators of Rangeland Health asks for ratings for: rills; water flow patterns; pedestals and/or terracettes; gullies; and wind- scoured, blowouts, and/or deposition areas, which are indicators for soil movement by water and/or wind	
76		22) Flow Pattern/Erosional Flow Patterns→Not Present	local	QL	Interpreting Indicators of Rangeland Health asks for a rating of "Water Flow Patterns" indicator	
77		24) Gullies (including incised channels)→Not Present or Minimal for Soil Type & Landform	local, regional	QL	Interpreting Indicators of Rangeland Health asks for ratings for: rills; water flow patterns; pedestals and/or terracettes; gullies; and wind- scoured, blowouts, and/or deposition areas, which are indicators for soil movement by water and/or wind	
78		25) Rills→Not Present or Minimal for Soil Type & Landform	LOCAL	QL	Interpreting Indicators of Rangeland Health asks for a rating of "Rills" indicator	
79		26) Plant Pedestaling→Not Present or Minimal for Soil Type & Landform	LOCAL	QL	Interpreting Indicators of Rangeland Health asks for a rating of "Pedestals and/or Terracettes" indicator	

	A	B	C	D	E	G
80		18) Nutrient Cycle→Adequate for the Vegetative Communities	LOCAL	QL	Interpreting Indicators of Rangeland Health asks for a rating of a "Functional/Structural Groups" indicator that is an indicator of nutrient cycling; asks for a rating of a "Litter Amount" indicator, which is an indicator of nutrient cycling.	
81		82) Evidence of Beneficial Natural Disturbances→Evident but not Catastrophic				
82	**Organic Matter/Litter/Microbes/Soil Fertility**	20) Bare Ground	local, regional	QN, QL	Interpreting Indicators of Rangeland Health asks for estimate of ground cover by bare ground; bare ground is also an indicator	
83		21) Rock, Stone, & Gravel (Amount & Distribution)	local	QN, QL	Interpreting Indicators of Rangeland Health asks for estimate of ground cover by rock/gravel	
84		33) Soil Microorganisms	local			
85		88) Organic Matter (Litter and Standing Dead Plant Material)→Adequate for Site Protection & Decomposition to Replenish Soil Nutrients, Support Nutrient Cycling, Maintain Soil Health		QN & QL	Interpreting Indicators of Rangeland Health asks for estimates of ground cover for litter, and standing dead vegetation; asks for rating of "Litter Amount" indicator	
86		89) Appropriate Plant Litter Accumulation→Evenly Distributed Across Landscape		QN & QL	Interpreting Indicators of Rangeland Health asks for estimates of ground cover for litter, but not across landscapes; asks for rating of "Litter Amount" indicator, but not across landscapes	
87		104) Litter and Standing Dead Plant Material→Adequate for Site Protection and for Decomposition to Replenish Soil Nutrients Relative to Site Potential		QN & QL	Interpreting Indicators of Rangeland Health asks for estimates of ground cover for litter, and standing dead vegetation; asks for rating of "Litter Amount" indicator	
88		108) Litter and Standing Dead Plant Material→Adequate for Site Protection and for Decomposition to Replenish Soil Nutrients Relative to Site Potential		QN & QL	Interpreting Indicators of Rangeland Health asks for estimates of ground cover for litter, and standing dead vegetation; asks for rating of "Litter Amount" indicator	
89	**Phenology/Photosynthetic Activity**	15) Biological Activity (Plant, Animal, & Insect)(needs definition: is this value laden, based on expectations, seasonably variable)				
90		16) Photosynthetic Activity→Occurs Throughout the Site	local, regional	QN, QL	Interpreting Indicators of Rangeland Health asks for a description of functional/structural groups and the number of species in each functional group (Indicator 12), and classifies each functional group's dominance in the plant community. An estimate of departure from the Ecological Side Description or Ecological Reference Area is requested. Ecological Site Inventory requires a list of species and composition by weight in the plant community.	

	A	B	C	D	E	G
91		80) Diversity of Plant Species with Various Phenological Stages & Rooting Depths→to Extend the Photosynthetic Period and Increase Energy Capture, and to Ensure Effective Nutrient Cycling		QN	Interpreting Indicators of Rangeland Health categorizes live vegetation into Functional/Structural Groups, and by estimation of cover or weight, the composition of each Group is compared between the Ecological Reference Area and the Area of Interest	
92		81) Photosynthetic Activity→Evident Throughout Growing Season, Consistent with Potential/Capability of Site, Evidenced by Plant Composition & Community Structure				
93	**Production**	15) Biological Activity (Plant, Animal, & Insect)(needs definition: is this value laden, based on expectations, seasonably variable)				
94		19) Energy Flow→Adequate for the Vegetative Communities	Local, regional	QL	Interpreting Indicators of Rangeland Health asks for a rating of a "Functional/Structural Groups" indicator that is an indicator of energy flow; asks for rating of "Annual Production" indicator, which is an indicator of energy captured by plants.	
95		SRR21. Rangeland above ground biomass.				
96		SRR22. Rangeland annual productivity				
97		SRR23. Percent of available rangeland grazed by livestock.				
98		SRR24. Number of domestic livestock on rangeland.				
99		SRR25. Presence and density of wildlife functional groups on rangeland.				
100		SRR26. Annual removal of native hay and non-forage plant materials, landscaping materials, edible and medicinal plants, and wood products.				
101	**Recruitment/Reproductive Capability**	13) Evidence of Plant Recruitment	local	QL	Interpreting Indicators of Rangeland Health allows for the option of including a comment on "evidence of recruitment" on the Rangeland Health Evaluation Summary Worksheet under the "Reproductive Capability of Perennial Plants" indicator	
102		14) Seed Production→Seed Stalks/Seed Adequate for Stand Maintenance for all Life-Forms	local	QL	Interpreting Indicators of Rangeland Health asks for a rating of "Reproductive Capability of Perennial Plants" indicator, which includes seed production	
103		77) Spatial Distribution of Plant & Animal Species & their Habitats→Allows for Reproduction and Recovery from Localized Catastrophic Events				

	A	B	C	D	E	G
104		78) Spatial Distribution of Native Plant & Animal Communities, with Density, Composition, and Frequency of Species→Suitable to Ensure Reproductive Capability & Sustainability				
105		79) Native Species Re-Occupy Habitat Niches & Voids Caused by Disturbances→Unless Management Objectives Call for Introduction or Maintenance of Non-native Species				
106		102) Plant Production, Seed Production, Cover→Adequate to Enable Recruitment when Favorable Climatic Events Occur		QN & QL	Interpreting Indicators of Rangeland Health asks for estimates of canopy cover of grasses, forbs, shrubs, trees, succulents, and biological crust; asks for estimate of ground cover of vascular plants; gives the option of ranking dominant (rather than all species) plant species by estimating weight (production); categorizes live vegetation into Functional/Structural Groups, and by estimation of cover or weight, the composition of each Group is compared between the Ecological Reference Area and the Area of Interest; asks for a rating of "Reproductive Capability of Perennial Plants" indicator, which includes seed production	
107	**Riparian**	35) Gradient →Appropriate for Landscape setting (landform, geology, and bioclimatic region); Adequate to dissipate Streamflow without Excessive Erosion or Deposition			TR 1737-9 Process for Assessing Proper Functioning Condition, and 1737-3 Inventory and Monitoring of Riparian Areas discuss the need to evaluate whether gradient is appropriate to landform.	
108		36) Stream Width/Depth Ratio→Appropriate for Stream Type; Appropriate for Valley Bottom Type (Geology, Hydrology, Soils); Adequate to Dissipate Streamflow w/out Excessive Erosion or Deposition	local	QL	TR 1737-9 Process for Assessing Proper Functioning Condition asks whether width-depth ratio is in balance with the landscape setting.	
109		37) Sinuosity of Stream Channel→Appropriate for Stream's Position on Landscape; Appropriate to Parent Materials; Adequate to Dissipate Streamflow w/out Excessive Erosion or Deposition	local	QL	TR 1737-9 Process for Assessing Proper Functioning Condition asks whether sinuosity is in balance with the landscape setting.	
110		38) Channel Roughness, Stream Channel Size→Appropriate for Stream's Position on Landscape; Appropriate to Parent Materials	local	QL		
111		39) Active Floodplain Present; Floodplain Inundated in Relatively Frequent Events	local	QL	TR 1737-9 Process for Assessing Proper Functioning Condition asks whether floodplain above bankfull is inundated in relatively frequent events.	

	A	B	C	D	E	G
112		40) Riparian/Wetland Vegetation Aiding in Floodplain Development and Captured Sediment	local, regional	QL	TR 1737-9 Process for Assessing Proper Functioning Condition asks whether there is diverse age class and composition of riparian vegetation for maintenance and recovery.	
113		41) Bank Stabilization/Stream Bank Stability, Bank Angles→ Appropriate for Stream Type (Shearing, Sloughing); Stream Channels not Entrenching	local	QL	TR 1737-9 Process for Assessing Proper Functioning Condition asks if system is vertically stable, if lateral movement is associated with natural sinuosity, and if channel characteristics are adequate to dissipate energy during high flows.	
114		42) Reduced Erosion/Minimal Substrate Sediments & Bare Ground; Erosion, Substrate Sediments, & Bare Ground→Appropriate for Stream Type and Watershed	local	QL	TR 1737-9 Process for Assessing Proper Functioning Condition asks if upland watershed is contributing to riparian wetland degradation; if stream is in balance with the water and sediment being supplied by the watershed	
115		43) Ground-water Recharge; Water Table Fluctuation				
116		44) Vegetation & Free Water Indicate High Water Tables; Riparian/Wetland Vegetation Increasing Recharge of Groundwater Appropriate to Site Potential; Plant Species Present that Indicate Soil Moisture Characteristics are Being Maintained	local	QL	TR 1737-9 Process for Assessing Proper Functioning Condition asks if vegetation species present indicate maintenance of riparian-wetland soil moisture characteristics.	
117		45) Dissipation of Energy by Vegetation; Dissipation of Energy by Channel Characteristics (i.e. rocks, coarse, and/or woody debris), Dissipation of Energy by Floodplain	local	QL	TR 1737-9 Process for Assessing Proper Functioning Condition asks if floodplain and channel characteristics are adequate to dissipate energy during high flows; if plant communities are an adequate source of coarse and/or large woody material.	
118		46) Bank Protection by Vegetation	local	QL	TR 1737-9 Process for Assessing Proper Functioning Condition asks if adequate riparian-wetland vegetative cover is present to protect banks and dissipate energy during high flows; if streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events.	
119		95) Riparian/wetland Vegetation with Deep Strong Binding Roots→Sufficient to Stabilize Streambanks & Shorelines				
120		47) Diversity in Age Class, Vertical Structure, Composition, and Life Form of Riparian Vegetation with Rooting Depths/Root Masses→Sufficient to Stabilize Stream Banks & Shorelines	local	QL	(Same as 46) TR 1737-9 Process for Assessing Proper Functioning Condition asks if point bars are vegetating with tiparian-wetland vegetation.	
121		48) Well-anchored Riparian Vegetation & Large Woody Debris→ Capable of Withstanding High Stream Flow Events	local	ql	(Same as 45 and 46) TR 1737-9 Process for Assessing Proper Functioning Condition asks	

	A	B	C	D	E	G
122		49) Vegetation Dominated by Appropriate Mix of Native or Desirable Introduced Species	local	QL		
123		96) Invader & Shallow Rooted Species are Minor Component of Floodplain				
124		50) Vigorous, Desirable Plants	local	QL		
125		97) Age Class & Structural Diversity of Riparian/Wetland Vegetation→Appropriate for the Site				
126		51) Recruitment of Preferred Species	local	QL		
127		52) Vegetation Reflecting Desired Plant Community	local	QL		
128		53) Habitat Sufficient to Provide for Food, Cover, and other Needs of Animal Riparian-Dependent Species	local	QL		
129		54) Diversity & Abundance of Insects & Amphibians	local	QL		
130		55) Where Appropriate, Plant Communities in Riparian Area are Adequate Source of Large Woody Debris	Local	QL		
131		56) Shallow-rooted, Invader Plant Species are not Displacing Native Species; Minimal Cover of Invader/Shallow-Rooted Species				
132		57) Noxious Weeds are Not Increasing				
133		58) Organic Matter→Adequate to Protect the Site and Replenish Soil Nutrients				
134		59) Point Bar Revegetation w/ Range of Age Classes & Successional Stages/Colonization & Stabilization by Woody Riparian Species on Gravel Bars & other Coarse Textured Stream Deposits				
135		60) Point Bars Being Created				
136		61) Pool Size & Frequency→Appropriate for Stream Type				
137		62) Pool/Riffle Ratio and Run Frequency→Appropriate for Valley Bottom Type, Geology, Hydrology, Soils				

	A	B	C	D	E	G
138		63) Where Appropriate, Shading→Sufficient to Provide Adequate Thermal Regulation for Fish & other Riparian-Dependent Species/Shading of Stream Water Surface (Results in Cooler Water in Summer & Reduced Icing in Winter)				
139		64) Tree & Shrub Utilization→Does not Reflect Heavy Utilization by Livestock and/or Wildlife				
140		65) Active, Stable Beaver Dams				
141		66) Little Evidence of Excessive Soil Compaction on Floodplain→ Attributable to Human Activities				
142		SRR9.Changes in the frequency and duration of surface no-flow periods in rangeland streams.				
143		SRR10. Percent of stream length in rangeland catchments in which stream channel geometry significantly deviates from the natural channel geometry.				
144	**Social**	SRR11. Extent of land area in rangeland.				
145		SRR54. Public beliefs, attitudes, and behavioral intentions toward natural resources.				
146		SRR55. Land Law and Property Rights. Extent to which laws, regulations, and guidelines clarify property rights and land tenure arrangements, recognize customary and traditional tights of indigenous people, and provide means of resolving property disputes by due process as they relate to the conservation and sustainable management of rangelands.				
147		SRR56. Institutions and Organizations. Extent to which governmental agencies, educational institutions, and other for-profit and not-for-profit organizations affect the conservation and sustainable management.				
148		SRR57. Economic Policies and Practices. Extent to which economic policies and practices support the conservation and sustainable management of rangelands.				

	A	B	C	D	E	G
149		SRR58. Public Information and Public Participation. Extent to which laws, regulations and guidelines, institutions and organizations provide opportunities for: (1) public access to information; and (2) public participation in the public policy and decision-making process relating to rangelands.				
150		SRR59. Professional Education and Technical Assistance. Extent to which laws, regulations, and guidelines, institutions, and organizations provide for professional education and the distribution of technical information and financial assistance related to the conservation and sustainable management of rangelands.				
151		SRR60. Land Management. Extent to which land management programs and practices support the conservation and sustainable management of rangelands.				
152		SRR61. Land Planning, Assessment, and Policy Review. Nature and extent of periodic range-related planning, assessment, and policy review activities, including planning and coordination between institutions and organizations.				
153		SRR62. Protection of Special Values. Extent to which laws, regulations, and guidelines, institutions and organizations provide for the management of rangelands to conserve special environmental, cultural, social and/or scientific values.				
154		SRR63. Measuring and Monitoring. Extent to which agencies, institutions, and organizations devote human and financial resources to measuring and monitoring changes in the condition of rangelands.				
155		SRR64. Research and Development. Nature and extent of research and development programs that affect the conservation and sustainable management of rangelands.				

	A	B	C	D	E	G
156		SRR35. The threat or pressure on the integrity of cultural and spiritual resource values.				
157		SRR36. Poverty rate (general).				
158		SRR37. Poverty rate (children).				
159		SRR38. Income inequality.				
160		SRR39. Index of social structure quality.				
161		SRR40. Community satisfaction				
162		SRR41. Federal transfers by categories (individual, infrastructure, agriculture, etc.)				
163		SRR42. Presence and tenure of natural resource nongovernmental organizations at the local level.				
164		SRR45. Agriculture (ranch/farm) structure.				
165		SRR46. Years of education.				
166		SRR48. Employment, unemployment, underemployment, and discouraged workers by industrial sector.				
167		SRR49. Land tenure, land use, and ownership patterns by size class.				
168		SRR50. Population pyramid and population change.				
169		SRR51. Income differentials from migration.				
170		SRR52. Length of residence (native, immigrant more than 5 years, less than 5 years.)				
171		SRR53. Income by work location vs. residence.				
172	**Soils**	27) Physical Soil Crusts/Surface Sealing→Minimal for Soil Type & Landform	local	QL	Interpreting Indicators of Rangeland Health asks for rating of “Soil Surface Resistance to Erosion” indicator, which includes physical soil crusting and surface sealing	
173		28) Soil Compaction Layers→Minimal for Soil Type & Landform	local	QL	Interpreting Indicators of Rangeland Health asks for rating of “Compaction Layer” indicator	
174		29) Deposition of Dunes→Absent or if Present, Doesn't Exceed What is Natural for the Site	local	QL	Interpreting Indicators of Rangeland Health asks for rating of wind-scoured, blowouts, and/or deposition areas; this would include deposition of dunes	
175		30) Thickness & Continuity of A Horizon	local	QL,QN	Interpreting Indicators of Rangeland Health asks for rating of “Soil Surface Loss or Degradation” indicator, which requires examination of soil surface horizon	
176		32) Infiltration Rates	local	QL,QN	Interpreting Indicators of Rangeland Health asks for rating of “Plant Community Composition and Distribution Relative to Infiltration and Runoff” indicator, which includes assessment of infiltration rates	

	A	B	C	D	E	G
177		93) Erosion (Rills, Gullies, Pedestals, Capping)		QL	Interpreting Indicators of Rangeland Health asks for rating of rills, gullies, pedestals, and Soil Surface Resistance to Erosion [which includes capping (physical or chemical crusting)] indicators	
178		94) Water Infiltration Rates		QL	Interpreting Indicators of Rangeland Health asks for rating of "Plant Community Composition and Distribution Relative to Infiltration and Runoff" indicator, which includes assessment of infiltration rates	
179		SRR1. Area and percent of rangeland soils with significantly diminished organic matter and/or carbon:nitrogen (C:N) ratio.				
180		SRR2. Area and extent of rangelands with changes in soil aggregate stability.				
181		SRR3. Assessment of microbial activity in rangeland soils				
182		SRR4. Area and percent of rangeland with significant change in extent of bare ground.				
183		SRR5. Area and percent of rangeland with accelerated soil erosion by water or wind.				
184	**Special Status Species**	85) Special Status Species & other Local Species of Concern are Healthy & in Numbers that Appear to Ensure Stable to Increasing Populations				
185		86) Habitat Areas are Large Enough to Support Diverse, Viable, and Desired Populations				
186		87) Habitat Connectivity or Presence of Corridors→Adequate to Prevent Habitat Fragmentation				
187	**Succession**	4) Diversity of Plant Species (species composition & age class)		QL	Interpreting Indicators of Rangeland Health asks for a description of functional/structural groups and the number of species in each functional group (Indicator 12), and classifies each functional group's dominance in the plant community. An estimate of departure from the Ecological Side Description or Ecological Reference Area is requested.Ecological Site Inventory requires a list of species and composition by weight in the plant community.	
188		68) Landscapes Composed of Several Plant Communities in a Variety of Successional Stages & Patterns	regional	QL		
189		101) Diversity of Perennial Species→Not Diminishing over time in Established Seedings				
190	**Vegetation Structure**					

	A	B	C	D	E	G
191	**Vigor**	11) Vigorous, Desirable Plants Present	local	QL	Interpreting Indicators of Rangeland Health asks for a rating for “Plant Mortality/Decadence” indicator, which could be used to indicate vigorous, desirable plants present; asks for a rating of “Reproductive Capability of Perennial Plants” indicator, which could be used to indicate vigor	
192		74) Plant Vigor (Total Plant Production, Seed & Seedstalk Production, Number of Wood Stalks, Cover)→Adequate to Maintain Desirable Plant & Animal Species and Ensure Reproduction and Recruitment of Plants & Animals when Favorable Climatic Events Occur	local	QL,QN	Interpreting Indicators of Rangeland Health asks for estimates of canopy cover of grasses, forbs, shrubs, trees, succulents, and biological crust; asks for estimate of ground cover of vascular plants; gives the option of ranking dominant (rather than all species) plant species by estimating weight (production); categorizes live vegetation into Functional/Structural Groups, and by estimation of cover or weight, the composition of each Group is compared between the Ecological Reference Area and the Area of Interest; asks for a rating of “Reproductive Capability of Perennial Plants” indicator, which includes seed & seedstalk production	
193		107) Plant Vigor (Production, Seed & Seedstalk Production, Cover, etc.) of Remnant Native or Seeded (Introduced) Plants→Maintained to Enable Reproduction and Recruitment When Favorable Climatic or Other Environmental Events Occur		QN & QL	Interpreting Indicators of Rangeland Health asks for estimates of canopy cover of grasses, forbs, shrubs, trees, succulents, and biological crust; asks for estimate of ground cover of vascular plants; gives the option of ranking dominant (rather than all species) plant species by estimating weight (production); categorizes live vegetation into Functional/Structural Groups, and by estimation of cover or weight, the composition of each Group is compared between the Ecological Reference Area and the Area of Interest; asks for a rating of “Reproductive Capability of Perennial Plants” indicator, which includes seed & seedstalk production	
194	**Water Quality**	109) Chemical Constituents→don't exceed applicable requirements				
195		110) Water Temperature→doesn't exceed applicable requirements				
196		111) Nutrient Loads→don't exceed applicable requirements				
197		112) Total Dissolved Solids				
198		113) Fecal Coliform→doesn't exceed applicable requirements				
199		114) Turbidity→doesn't exceed applicable requirements				
200		115) pH				
201		116) Conductivity				
202		117) Suspended Sediment→doesn't exceed applicable requirements				
203		118) Color				
204		110) Toxins				

	A	B	C	D	E	G
205		111) Ammonia, Barium, Boron, Chlorides, Chromium, Cyanide, Endosulfan, Lindane, Nitrates, Phenols, Phosphorus, Sodium, Sulfates				
206		112) Dissolved Oxygen Concentration→doesn't exceed applicable requirements; [Note this doesn't make much sense to me; probably needs to be stated as "within the approved range"]				
207		113) Sediment, Scum, Floating Debris, Odor, Heavy Metal Precipitates on Channel Substrate, within Surface & Ground Waters, Attributable to Humans→are within the Amounts, Concentrations, or Combinations as Directed by the Water Quality Standards Established by the state of Colorado 5 CCR 1002-8				
208		114) Aquatic Organisms & Plants (Macroinvertebrates, Fish, Algae, & Plants)→Indicate Support for Beneficial Uses				
209		115) Appropriate Populations of Macroinvertebrates, Vertebrates, and Algae are Present				
210		116) Plant & Animal Species				
211		117) Monitoring Results or Other Data→that Show Water Quality is Meeting the Standard				
212		118) Effects of Management Activities on Beneficial Uses→as Defined under the Clean Water Act and State Implementing Regulations				
213		SRR6. Percent of water bodies in rangeland areas with significant changes in natural biotic assemblage composition.				
214		SRR7. Percent of surface water on rangeland areas with significant deterioration of their chemical, physical, and biological properties from acceptable levels.				
215	**Wildlife**	99) Escape Terrain				
216		100) Edge-Patch Snags				
217		SRR12. Rangeland area by plant community.				
218		SRR13. Number and extent of wetlands.				

	A	B	C	D	E	G
219		SRR14. Fragmentation of rangeland and rangeland plant communities.				
220		SRR15. Density of roads and human structures.				
221		SRR16. Integrity in natural fire regimes on rangeland.				
222		SRR17. Extent and condition of riparian systems				
223		SRR18. Area of infestation and presence/absence of invasive and other nonnative plant species of concern.				
224		SRR19. Number and distribution of species and communities of concern.				
225		SRR20. Population status and geographic range of rangeland-dependent species.				

National Assessment Prototype

June 2000

National Assessment Prototype
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Cover: BLM management responsibilities

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Description of Products 2
Uses 3
Considerations 4

Maps and narratives for western United States (Section 1) and Alaska (Section 2)

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2. BLM surface parcel size
3. Vegetation assemblages
4. Cultural sites
5. Air quality
6. Water quality
7. Riparian condition -- "acceptable"
8. Riparian condition – "unacceptable"
9. Special status species
10. Fire frequency and land condition
11. Weed distribution
12. Special recreation permits
13. Oil and gas application for permit to drill approvals
14. Land use conversion
15. Economic dependency
16. Grazing revenue
17. Leasable mineral revenues
18. Per capita income
19. Population density
20. Population density change

Mylar Overlays

1. BLM management responsibilities
2. Special status species
3. Land use conversion
4. Population density
5. Congressional districts

ELT Meeting
January 25 - 27, 2000, Santa Fe, New Mexico

ASSESSMENT STRATEGY

Background
In the 1997-2001 Strategic Plan, the BLM has committed to *"develop and implement a comprehensive strategy for systematic resource assessment on the public lands."* A successful strategy will provide the information necessary to support budget requests, set defensible priorities for funding allocation, and generate a credible record of the condition of the Public Lands. It will highlight essential information needs as well as extraneous data collection efforts.

A preliminary assessment strategy was presented to the ELT in September, 1999. At that meeting, the ELT approved further work by the Assessment Strategy Team and provided for upper management representation (Kesterke, Bauer). Subsequently, a small group was charged with identifying socioeconomic indicators to be combined with natural resource indicators. Three members from that group were then added to the overall strategy team [team list attached]. This team met in October and again in December to further develop the strategy and address concerns raised by the ELT.

Issue
The primary issue for the ELT is how best to proceed.

Recommendation
The team recommends a stepwise approach to test and further refine the strategy. The first step would be to:

- Conduct a prototype assessment at the national level
    - using a small team (3 - 4) of full-time employees,
    - a minimum suite of indicators [proposed indicators attached], and
    - relying on existing data and information from both internal and external sources.

- Complete the prototype by mid-July, 2000; report results to the ELT in a highly visual format [sample attached].

- Provide recommendations to the ELT on the next step(s) in September, 2000.

Assessment Strategy Team

AZ	Gary Bauer	Phoenix
AZ	Al Burch	Phoenix
CO	Mark Stiles	Montrose
ID	Mike Pellant	Boise
MT	John Thompson	Billings
NM	Joan Resnick	Albuquerque
OR	Jerry Magee	Portland
WY	Mike Blymyer	Cody
WY	Alan Kesterke	Cheyenne
WY	Roy Allen	Cheyenne
TC	Dennis Oaks	Phoenix
WO	Kit Muller	101
WO	Jim Colby	200
WO	Pat Green	210
WO	Ted Milesnick	210
WO	Paul Politzer	210
WO	Jim Stone	210
WO	Dick Mayberry	220
WO	Rick Tholen	230
WO	Erick Kaarlela	300
WO	Ann Aldrich	640

Proposed Indicators for National Assessment

Criteria	Indicator(s)	Expressed As	Potential Data Source	Comments
BIOPHYSICAL				
Surface Disturbance	Road, Power Line Canal Density	occurrence in mi/sq mi	USGS, BLM	also for weed spread & habitat fragmentation
Uncharacteristic Fire Risk	Fire Risk Rating	risk classes	USFS/NIFC	existing map
Uncharacteristic Insect/Disease Risk	Insect/Disease Risk Rating	risk classes	USFS	existing map for forest areas
Habitat Extent	Amount/Pattern of Vegetation Types	vegetation type classes	USGS-BRD (GAP), TNC	desirable to compare current to historic
Habitat Risk	Invasive Species	% of area, rate of spread, # of species	State Ag Dept, BLM weed team	risk rating preferred over presence
Habitat Risk	Special Status Species	# species by area, risk classes	FWS, TNC, NMFS, States	could separate aquatic & terrestrial; risk rating preferred over presence
Water Quality	Index of Watershed Indicators	condition class and vulnerability class	EPA	to be interpreted by BLM ownership
Riparian Risk	PFC rating	% of total miles functioning at risk	BLM	will need FO help for compilation
Soil Stability	Soil Erosion Susceptibility	susceptibility classes	NRCS, USGS, NARSC	some development work required
Air Quality	Non-Attainment of Standards	areas of non-attainment	EPA	
SOCIOECONOMIC				
Human Needs and Impacts (Projected)	Population Growth Areas	in proximity to PL	Census Bureau, BLM	existing map (Pat Green)
Human Use Levels (Actual)	Recreation Use	number of user days by area	States, BLM	source uncertain
Human Use Levels (Actual)	Use Authorizations	numbers and rates of change	BLM	ROW, APD, grazing, mineral leasing, etc.
Loss of Open Space	Land Use Conversion	Rate Change	States, Counties, NRI, TNC	related to habitat risk
Dependency on Public Lands	Economic Sectors	income/employment by sector by county	REIS, BEA	analyze for changes over time
PL Contribution to Local Economies	Transfer Payments, Receipts	% of County or State revenue	BLM, Counties	

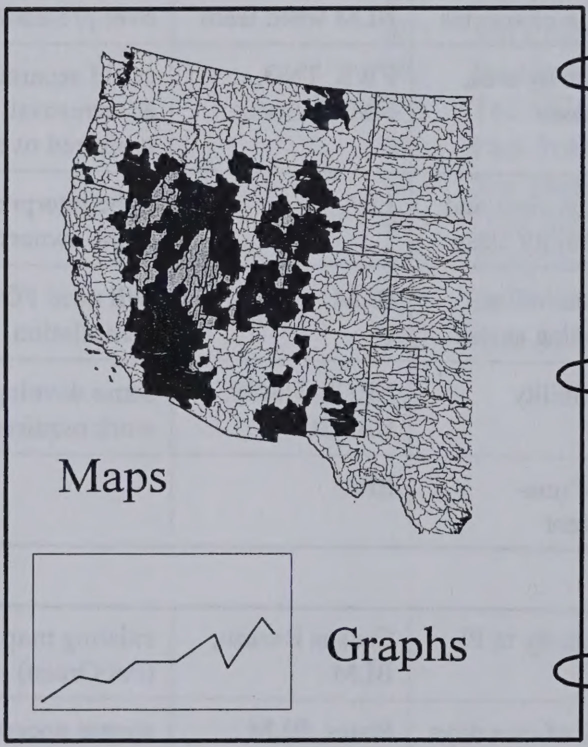
ADDITIONAL INFORMATION for use in analysis and interpretation of the above indicators:

Land Status/Ownership (include surface & major subsurface in the West)

Administrative Unit Boundaries (e.g. States, Counties, FOs, ACECs, WSAs, NCAs, RNAs etc.)

Watershed Unit Boundaries (particularly subbasins [8-digit watersheds] as defined by USGS/EPA)

Sample format for reporting on each indicator in the national assessment prototype.



Indicator: *what is the indicator and what does it represent; if an index, what are the components?*

Key Findings: *what does this information tell us about conditions on the land; are there significant implications for management?*

Limitations: *what is the quality of the data and what (if any) caution should be used in interpreting?*

Source: *where did the data come from?*

Comments: *does this indicator need to be improved; how might this be done; are there efforts underway to do so?*

Resource Assessment

Executive Leadership Team Meeting
Santa Fe, New Mexico
1/25-27/00

Briefing Outline

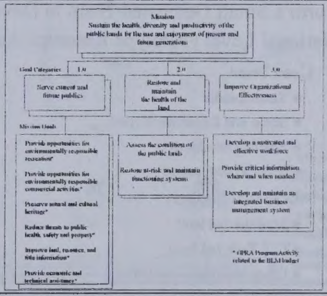
- Strategic Plan
- Background
  - Purpose
  - Uses
  - Guidelines
- Recommended Strategy
  - Product/Format Examples
  - Indicators
- Actions Needed

Strategic Plan

- 1997-2001 Strategic Plan
  - *"Develop and implement a comprehensive strategy for systematic resource assessment on the public lands"* (to be completed by 2001)
- 2001-2005 Draft Strategic Plan
  - *"Understand the condition of the land"*
  - Objective 1.1
    - BLM Will Assess the Condition of the Public Lands on 216 Subbasins* by FY 2005

*Containing at Least 25 Percent Public Lands

Bureau of Land Management 2001-2005 Strategic Plan Framework


Mission
Sustain the health, diversity and productivity of the public lands for the use and enjoyment of present and future generations
Goal Categories
1.0
2.0
3.0
Serve current and future publics
Restore and maintain the health of the land
Improve Organizational Effectiveness
Mission Goals
Provide opportunities for environmentally responsible recreation*
Provide opportunities for environmentally responsible commercial activities*
Preserve natural and cultural heritage*
Reduce threats to public health, safety and property*
Improve land, resource, and title information*
Provide economic and technical assistance*
Assess the condition of the public lands
Restore at-risk and maintain functioning systems
Develop a motivated and effective workforce
Provide critical information where and when needed
Develop and maintain an integrated business management system
* GPRA Program Activity related to the BLM budget

Background

- Assessment Purpose
  - Assemble and Analyze Data to Identify
    - Condition of Lands and Resources
    - Anticipated Demands and Risks
    - Opportunities and Priorities

Background (continued)

- Assessment Uses
  - Budget Development
  - Policy and Legislation
  - Budget Allocation
  - Oversight
  - Priority Setting
  - Help Focus/Facilitate Land Use Planning at National, Regional, State and Local Levels

Background (continued)

- Assessment Guidelines
  - Use Minimal Set of Indicators
  - Subbasin is Basic Building Block
  - Relies on Available Data
  - Minimizes Collection of New Data
  - Complements Other Assessments
  - Provides Periodic Snapshot (Not Continuous Effort)
  - Can be Periodically Updated
  - Can be Used to Foster and Enhance Partnerships

Recommended Strategy

- Begin a Phased Approach Where First Phase Represents a National Prototype
  - Complete Prototype by Mid July, 2000
    - Prototype Would
      - Refine Process
      - Test/Refine Indicators
      - Identify
        - Data Availability
        - Data Quality Issues
        - Product Utility
        - Next Steps Required Relative to Additional Assessment Efforts
  - Provide Recommendations to ELT on Next Step(s) in September, 2000

Recommended Strategy

- Form a Small Dedicated Team to Develop a National Level Prototype Resource Assessment
  - Core Team
    - Team Leader
    - Socio and Economic Expert
    - Spatial Data Expert
    - Bio-Physical expert
  - Additional Support
    - Modeler (ad hoc)
    - GIS Tech (ad hoc)
    - Other assistance as needed

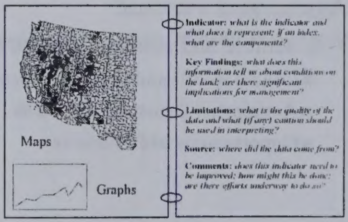
Recommended Strategy (Cont.)

- Team Responsibility
  - Review Existing Regional and National Resource Assessments
  - Draft Resource Assessment Prototype for BLM Administered Lands in the West by Mid-July, 2000
    - Focus Effort by Using Readily Available Existing Data
    - Produce a Report and Set of Maps Portraying Resource Assessment Based on Identified Indicators
  - Analyze Utility of Product Developed
    - Relevance to Strategic Plan
    - Ability to Depict Broad Areas at Risk
  - Report Results to Resource Assessment Team

Recommended Strategy (Cont.)

- Team Responsibility (Continued)
  - Present Report in a Visual Format to ELT by Mid-July, 2000
  - Complete Resource Assessment Prototype and Provide Recommendations to ELT Regarding Future Needs for Resource Assessments by September, 2000

Team Product and Format



Indicator: *what is the indicator and what does it represent; if an index, what are the components?*

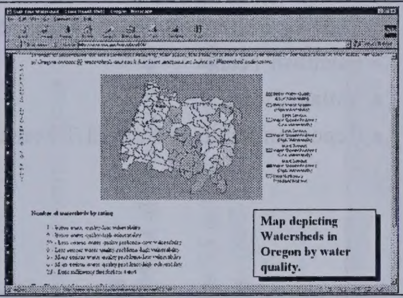
Key Findings: *what does this information tell us about conditions on the land; are there significant implications for management?*

Limitations: *what is the quality of the data and what (if any) caution should be used in interpreting?*

Source: *where did the data come from?*

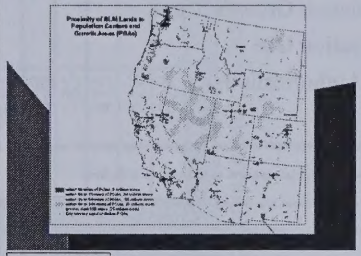
Comments: *does this indicator need to be improved; how might this be done; are there efforts underway to do so?*

Use of Existing Data



Map depicting Watersheds in Oregon by water quality.

Visual Examples

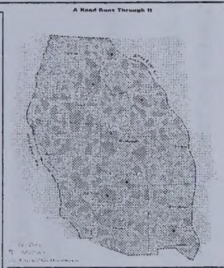

Proximity of BLM Lands to Population Centers and Growth Areas (PGAs)

Map of Western United States depicting BLM acreage within 10 to 100 miles of Population centers and growth areas (PGA's).

This information is helpful in determining population related pressures to be expected on BLM administered lands.

Source: Pat Green, BLM

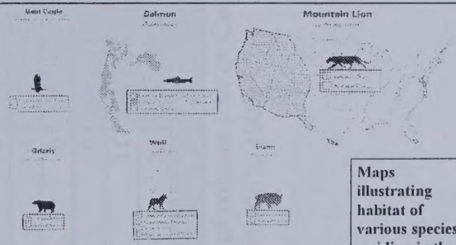
Visual Examples (Continued)


A Road Runs Through It

Map illustrating location of lands in the west as they relate to the location of paved roads.

Source: Atlas of the New West, Center of the American West, University of Colorado at Boulder, 1997.

Visual Examples (Continued)


Salmon
Mountain Lion
Grizzly
Wolf

Maps illustrating habitat of various species residing in the west.

Source: Atlas of the New West, Center of the American West, University of Colorado at Boulder, 1997.

Visual Examples (Continued)

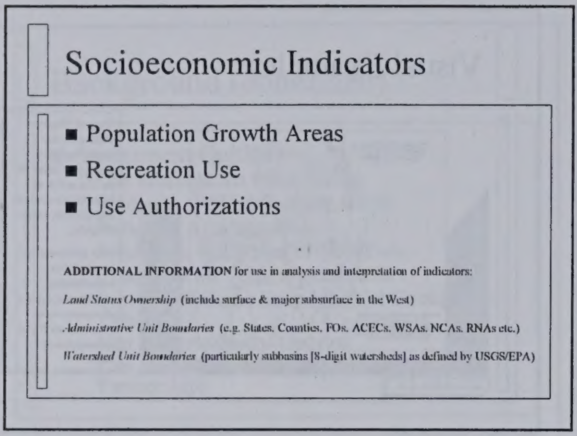
A Wealth of Public Lands

Map illustrating the ownership and location of public lands in the west.

Source: Atlas of the New West, Center of the American West, University of Colorado at Boulder, 1997

Biophysical Indicators

- Road, Power Line, Canal Density
- Fire Risk Rating
- Insect/Disease Risk Rating
- Amount/Pattern of Vegetation Types
- Invasive Species
- Special Status Species
- Index of Watershed Indicators
- PFC Rating
- Soil Erosion Susceptibility
- Non-Attainment Status



Socioeconomic Indicators

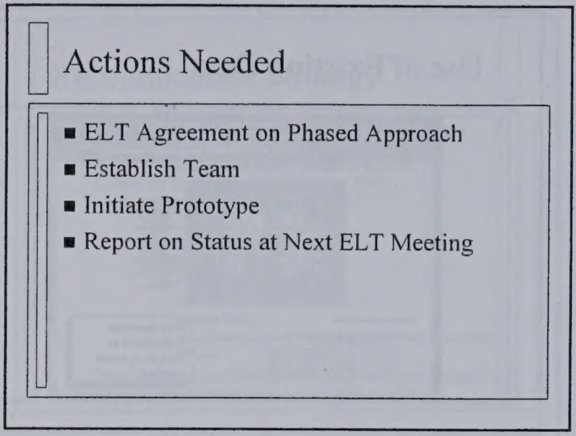
- Population Growth Areas
- Recreation Use
- Use Authorizations

ADDITIONAL INFORMATION for use in analysis and interpretation of indicators:

Land Status Ownership (include surface & major subsurface in the West)

Administrative Unit Boundaries (e.g. States, Counties, FOs, ACECs, WSAs, NCAs, RNAs etc.)

Watershed Unit Boundaries (particularly subbasins [8-digit watersheds] as defined by USGS/EPA)



Actions Needed

- ELT Agreement on Phased Approach
- Establish Team
- Initiate Prototype
- Report on Status at Next ELT Meeting

Land Health Assessment Report
Cumulative September 30, 2003

1. As of September, 2003 we have assessed nearly 69 million acres (43 % of the lands outside of Alaska), and made determinations on 8753 allotments (40%)
2. We are meeting Standards for Rangeland Health on 40 million acres (58%) of this area or 6518 allotments (74%).
3. Current Livestock Management is a significant causal factor for not meeting standards on 1119 allotments (50% of allotments where standards are not met)
4. Changes in management (including vegetation treatments) have been implemented on 22 million (87%) of the 25 million acres which were not meeting standards as a result of existing livestock grazing management, or 967 of the 1119 allotments (86%).

TABLE 1
Allotments

State	Meeting or making significant progress toward meeting all standards		Rangelands not meeting all standards (livestock a significant causal factor), appropriate action taken to ensure significant progress toward achievement.		Rangelands not meeting all standards (livestock a significant causal factor), no action taken		Rangelands not meeting standards or making significant progress toward achievement (livestock not a significant causal factor)		Total Allotments Assessed	Total Allotments not Assessed	Total Allotments
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
AZ	347	94%	11	61%	7	39%	3	1%	368	475	843
CA	315	75%	41	73%	15	27%	50	12%	421	264	685
CO	962	77%	204	98%	4	2%	82	7%	1252	1115	2367
ID	486	63%	182	91%	18	8%	82	11%	768	1505	2273
MT	2752	75%	144	83%	30	17%	755	21%	3681	1575	5256
NV	119	57%	71	95%	4	5%	14	7%	208	577	785
NM	65	76%	11	100%	0	0	9	11%	85	2205	2290
OR	352	81%	43	81%	10	19%	31	7%	436	1636	2072
UT	387	76%	62	85%	11	15%	50	10%	510	985	1495
WY	733	72%	198	79%	53	21%	40	4%	1024	2538	3562
BLM	6518	74%	967	86%	152	14%	1116	13%	8753	12875	21628

Column (b) is a percentage of column (i); Column (d) is a percentage of column (c)+(e); Column (f) is a percentage of column (c)+(e); Column (h) is a percentage of column (i) Columns (b), (d), (f), and (h) will not add to 100%

Land Health Assessment Report
Cumulative September 30, 2003

TABLE 2
Acres

State	Meeting or making significant progress toward meeting all standards		Rangelands not meeting all standards (livestock a significant causal factor), appropriate action taken to ensure significant progress toward achievement.		Rangelands not meeting all standards (livestock a significant causal factor), no action taken		Rangelands not meeting standards or making significant progress toward achievement (livestock not a significant causal factor)		Total Acres Assessed	Total Acres not Assessed	Total Acres in Grazing Allotments	Percent of Total Acres with completed assessment
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
AZ	5,007,207	89%	354,387	63%	212,317	37%	26,936	0.5%	5,600,847	6,327,025	11,927,872	47%
CA	3,036,001	66%	651,712	64%	364,858	36%	513,500	11%	4,566,071	3,309,016	7,875,087	58%
CO	3,604,578	67%	1,429,915	98%	24,573	2%	346,928	6%	5,405,994	3,359,696	8,765,690	62%
ID	2,071,548	33%	3,107,360	87%	451,292	13%	623,936	10%	6,254,136	5,547,180	11,801,316	53%
MT	4,878,802	86%	474,235	76%	148,119	24%	163,360	3%	5,664,516	2,478,937	8,143,453	70%
NV	6,403,211	36%	9,679,801	94%	672,104	6%	1,029,740	6%	17,784,856	27,930,607	45,715,463	39%
NM	362,172	79%	92,314	100%	0	0	6,000	1%	460,486	11,991,258	12,451,744	4%
OR	3,188,577	63%	1,071,139	68%	504,999	32%	280,058	6%	5,044,773	8,854,722	13,899,495	36%
UT	4,815,068	65%	1,146,501	82%	259,946	18%	1,239,416	17%	7,460,931	15,004,242	22,465,173	33%
WY	6,323,768	59%	3,528,134	84%	655,895	16%	192,347	2%	10,700,144	7,184,016	17,884,160	60%
BLM	39,690,932	58%	21,535,498	87%	3,294,103	13%	4,422,221	6%	68,942,754	91,986,699	160,929,453	43%

Column (b) is a percentage of column (i); Column (d) is a percentage of column (c)+(e); Column (f) is a percentage of column (c)+(e); Column (h) is a percentage of column (i) Columns (b), (d), (f) and (g) do not add to 100%

The State of the Nation's Ecosystems

HOME

Background and Summary

The State of the Nation's Ecosystems: Background and Summary

The State of the Nation's Ecosystems

We all rely on a familiar set of indicators—interest rates, unemployment, inflation, the Dow Jones index, and GDP, for example—to gauge the performance of the national economy. No such measures are currently available to describe the environment.

The State of the Nation's Ecosystems lays out a blueprint for periodic reporting on the condition and use of ecosystems in the United States. Developed by experts from businesses, environmental organizations, universities, and federal, state, and local government agencies, it is designed to provide policymakers and the general public with a succinct and comprehensive—yet scientifically sound and nonpartisan— view of "how we are doing." Participants and contributors represent a wide array of political perspectives and include experts from the fields of ecology, chemistry and toxicology, hydrology, oceanography, limnology, use of satellite remote sensing, forestry, farming, range management, and many others. The book identifies the major characteristics of ecosystems that should be tracked through time to provide this view, and where possible, provides information on both current conditions and historic trends. The book also highlights key gaps—situations where data do not exist or have not been assembled to support national reporting. Separate chapters report on coasts and oceans, farmlands, forests, fresh waters, grasslands and shrublands, and urban and suburban areas. These ecosystem-specific indicators are complemented by "core national indicators" that provide a highly aggregated view of overall conditions.

Who should be interested in reading this report?

- Decision makers in natural resource management and environmental policy in federal, state, andlocal government agencies, as well as in environmental organizations, businesses, and tradeassociations
- Academics with a research or teaching interest in environmental quality and ecosystem condition
- Interested laypersons
- Instructors for environmental studies and ecosystems courses, who may also wish to use the volume as a main or supplementary textbook for students to illustrate key aspects of ecosystems in the United States

The State of the Nation's Ecosystems provides a prescription for "taking the pulse" of America's lands and waters. It identifies what should be measured, counted, and reported so that decision makers and the public can understand the changes that are occurring in the American landscape.

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The State of the Nation's Ecosystems

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Core National Indicators

REVISED PAGE: ANNUAL UPDATE 2003

Introduction to the Nationl Indicators Chapter *(2002 Report)*

	What are the Core National Indicators?		Can we report trends? Are there other useful reference points?	
System Dimensions				Updated
◐	**Ecosystem Extent**	What is the area of the six major ecosystem types?	Some trends	2003
?	**Fragmentation and Landscape Patterns**	How fragmented are natural lands into smaller, more isolated patches? How are developed lands intermingled within the natural landscape?	No data reported	
Chemical and Physical Conditions				Updated
●	**Movement of Nitrogen**	How much nitrogen leaves watersheds across the country, and how much is delivered to coastal waters?	Trends	2003
◐	**Chemical Contaminants**	How frequently are chemical contaminants found in ecosystems, and how often do they exceed standards and guidelines for the protection of human health and aquatic life?	Current data only, federal standards and guidelines	2003

Biological Components				Updated
◐	**At-Risk Native Species**	How many native species are at different levels of risk of extinction?	Current data only	
?	**Condition of Plant and Animal Communities**	What fraction of U.S. lands and waters are highly managed or highly altered, and what levels of disturbance are found on natural/semi-natural lands?	No data reported	
●	**Plant Growth Index**	What are the trends in plant growth in different regions and different ecosystems?	Trends	2003

Human Uses				Updated
●	**Production of Food and Fiber and Water Withdrawals**	How are the quantities of key ecosystem-related commodity goods changing over time?	Trends	2003
◐	**Outdoor Recreation**	How often do people take part in outdoor recreation activities, and which kinds?	Current data only	2003
?	**Natural Ecosystem Services**	What other services, such as soil building and flood protection, are provided by natural ecosystems?	No data reported	

●	All necessary data Available	◐	Partial data available	⊖	Data not adequate for national reporting	?	Indicator development needed

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REVISED PAGE: ANNUAL UPDATE 2003

Introduction to the Forests Chapter

(2002 Report)

What Indicators are used to describe Forests?			Can we report trends? Are there other useful reference points?	
System Dimensions				Updated
●	**Forest Area and Ownership**	How much forest land is there in the US? How much is privately owned and how much is publicly owned?	Trends, regional comparison	2003
●	**Forest Types**	How is the area occupied by major forest types changing?	Trends, regional comparison	2003
●	**Forest Management Categories**	How intensively managed are U.S. forest lands?	Trends, regional comparison	2003
◐	**Forest Pattern & Fragmentation**	How fragmented are U.S. forests?	Trends, regional comparison	

Chemical and Physical Conditions				Updated
●	**Nitrate in Forest Streams**	How much nitrate is there in forest streams?	Current data only. Federal standard, cross-ecosystem comparison	
◐	**Carbon Storage**	How much carbon is stored in U.S forests?	Trends, regional comparison	2003

Biological Components				Updated
◐	**At-Risk Native Species**	What are the percentages of forest-dwelling species that are at different levels of risk of extinction?	Current data only, regional comparison	
⊖	**Area Covered by Non-native Plants**	What percentage of the plant cover in forests is not native to the region?	No data reported.	
◐	**Forest Age**	How much of the Nation's forests is young, middle-aged, or old?	Regional comparison	2003
●	**Forest Disturbance: Fire, Insects, and Disease**	How many acres are affected each year by fires, insects, and disease?	Trends	2003
⊖	**Fire Frequency**	Are forest fires burning much more or less frequently than in pre-settlement times?	No data reported.	
⊖	**Forest Community Types With Significantly Reduced Area**	How much area is occupied by forest types that have significantly declined in area since pre-settlement times? Are these forest types increasing or decreasing in area at present?	No data reported.	

Human Uses				Updated
●	**Timber Harvest**	How much Timber is harvested each year and what is it used for?	Trends, regional comparison	2003
●	**Timber Growth and Harvest**	How much Timber grows each year, compared to the amount that is cut?	Trends, regional comparison	2003
●	**Recreation in Forests**	How much recreational activity takes place in the Nation's forests?	No data reported.	2003

●	All necessary data Available	◐	Partial data available	⊖	Data not adequate for national reporting	?	Indicator development needed

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Introduction to the Grasslands Chapter

(2002 Report)

	What indicators are used to describe Grasslands and Shrublands?		Can we report trends? Are there other useful reference points?	
System Dimensions				Updated
●	**Area of Grasslands and Shrublands**	How much land is covered by grasslands and shrublands?	Current data only	
◐	**Land Use**	How are grasslands and shrublands used? How many acres are used for livestock grazing; oil, gas, and mineral development; rural residences; intensive recreation; "protected areas"; and the Conservation Reserve Program?	Trends	2003
⊖	**Area and Size of Grassland and Shrubland Patches**	What fraction of grasslands and shrublands is found in patches of various sizes?	No data reported	

Chemical and Physical Conditions				Updated
⊖	**Nitrate in Groundwater**	How much nitrate is there in groundwater in grasslands and shrublands?	No data reported	
⊖	**Carbon Storage**	How much carbon is stored in grasslands and shrublands?	No data reported	
●	**Number and Duration of Dry Periods in Streams and Rivers**	How many streams have zero flow for at least one day a year? For these streams, are the dry periods getting longer or shorter?	Trends	
⊖	**Depth to Shallow Groundwater**	What is the depth to shallow groundwater in various parts of the country?	No data reported	

Biological Components				Updated
◐	**At-Risk Native Species**	How many grassland and shrubland native species are at different levels of risk of extinction?	Current data only	
⊖	**Non-Native Plant Cover**	What percentage of grassland and shrubland plant cover is not native to the region?	No data reported	
●	**Population Trends in Invasive and Noninvasive Birds**	Are invasive bird populations increasing more than other bird populations?	Trends	
⊖	**Fire Frequency Index**	Are grassland and shrubland fires occurring more or less frequently than in presettlement times?	No data reported	
?	**Riparian Conditions**	What is the condition of stream banks (riparian areas) in grassland and shrubland areas?	No data reported	

Human Uses				Updated
●	**Production of Cattle**	How many cattle are fed on grasslands and shrublands?	Trends	2003
⊖	**Recreation on Grasslands and Shrublands**	How much recreational activity takes place on the nation's grasslands and shrublands?	No data reported	

●	All necessary data Available	◐	Partial data available	⊖	Data not adequate for national reporting	?	Indicator development needed

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Forest Health Indicators

Forest Inventory and Analysis Program

USDA
United States
Department of
Agriculture

Forest Service

FS-746
October 2002

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INTRODUCTION

Forest Inventory and Analysis. The Forest Service Forest Inventory and Analysis (FIA) Program is the Nation's continuous forest census. Since 1930, we have collected, analyzed, and reported information on the status and trends of America's forests: how much forest exists, where it exists, who owns it, and how it is changing – growing, dying, or being harvested. In response to widening customer interests, the FIA Program is developing a core program that will be implemented in the same manner on all U.S. forest lands. It includes sampling an extended suite of forest health indicators. The purpose of this brochure is to describe these health indicators: what we are measuring, why we believe these measurements are important, how we collect and interpret the data, and examples of what we have found to date. The FIA indicators discussed in this brochure are:

- Crown Condition
- Ozone Injury
- Tree Damage
- Tree Mortality
- Lichen Communities
- Down Woody Debris
- Vegetation Diversity and Structure
- Soil Condition

These indicators were developed and initially measured by the Forest Health Monitoring (FHM) Program in the 1990s. In 1999, they were transferred to FIA and now are a subset of the FIA sample grid (one forest health plot for every 16 standard FIA plots). On the forest health plots, core FIA measurements (for example, height, diameter, species) are made, as well as the forest health measurements.

FIA Customers and Data Users. The FIA Program has a diverse and growing set of customers that are interested not only in reports and analyses produced by FIA, but also in using the actual FIA data itself. Congress, State legislators, and State foresters have long used FIA information as a basis for formulating sound forest policy. Forest industry, environmental organizations, and a wide range of private consultants use FIA information for business planning. Government and academic researchers use FIA data as a basis for further research. And land managers at all levels are relying on FIA data for a strategic look at forest resources and as a basis for forest planning at the strategic scale. All of these users have expressed interest in the broader suite of FIA measures that includes indicators of forest health.

FIA also contributes data and analyses to a variety of national and global assessments. FIA data address at least 38 of the 67 Criteria and Indicators of Sustainability for reporting under the Montreal Process. FIA data are key for producing the reports required by the Resource Planning Act and are increasingly being used to support regional resource assessments used as a basis for forest planning.

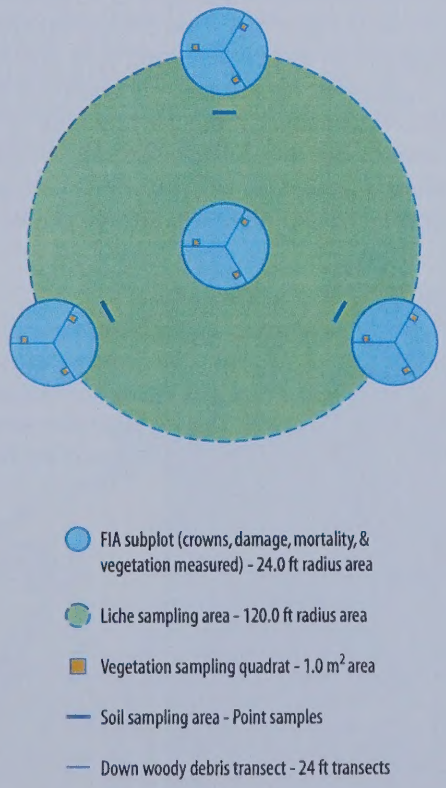
Researchers and policymakers are using FIA data about forest soils, down woody debris, and tree biomass to estimate carbon budgets and to model the potential for carbon sequestration under different management scenarios. The fire management community is using the forest structure and down woody debris data to identify areas at highest risk of catastrophic fire and opportunities for preventative treatments. Land managers use understory vegetation data to track increases of invasive species. Many partners use FIA data on ozone injury, lichen community composition, tree damage, and tree crown condition to report, as required by several international treaties, on overall forest health and probable impacts of air quality and acid deposition.

Brochure Format. The majority of this brochure is devoted to descriptions of each forest health indicator. Each indicator is featured on two facing pages with the following sections:

- **What is the indicator?**
- **Why is it important?**
- **How is it measured?**
- **How can the data be used?**

More Information. For more detailed information about the FIA Program and the forest health indicators, including field methods, please visit the FIA Web site at http://fia.fs.fed.us. Information about the FHM Program is available at http://www.na.fs.fed.us/spfo/fhm/.

FIA Plot Design for Forest Health Indicators


FIA subplot (crowns, damage, mortality, & vegetation measured) - 24.0 ft radius area
Liche sampling area - 120.0 ft radius area
Vegetation sampling quadrat - 1.0 m² area
Soil sampling area - Point samples
Down woody debris transect - 24 ft transects

Crown Condition

What Is the Crown Condition Indicator? The crown indicator is based on the amount, condition, and distribution of foliage, branches, and growing tips of trees (see photo below). There are five components of the crown indicator:

- *Ratio* – the length of the tree with branches, divided by the total tree height.
- *Density* – a visual estimate of the fullness of the crown, based on the amount of skylight blocked from view by leaves, branches, bole, and fruits.
- *Foliar transparency* – an estimate of the amount of skylight seen in the foliage parts of branches.
- *Dieback* – the death of the sun-exposed, growing twigs in the upper crown.
- *Diameter* – the width of the tree crown. It is estimated with models.

Why Is the Crown Indicator Important? In addition to being aesthetically pleasing, tree crowns provide shade, temperature moderation, and food and habitat for many organisms. They also are a source of fuel for wildfires. Crowns give a quick evaluation of general tree health. Healthy, full crowns suggest carbon is being stored; the tree is growing; and there are no serious impacts from pathogens, air pollutants, or insects.

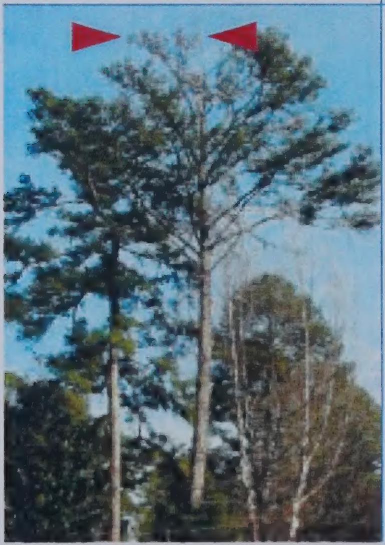


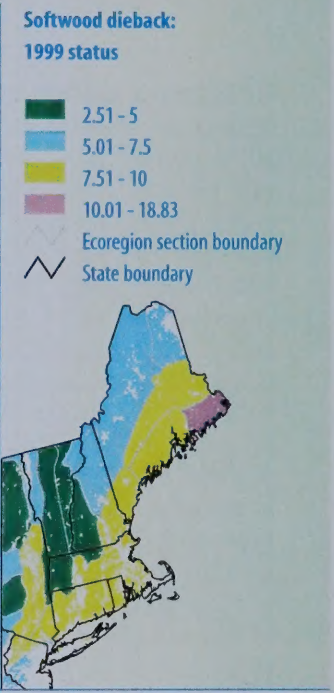
PHOTO BY KENNETH STOLTE

High foliage transparency (left arrow) and dieback (right arrow) of a pine tree under stress; note healthy crowns of other pines.

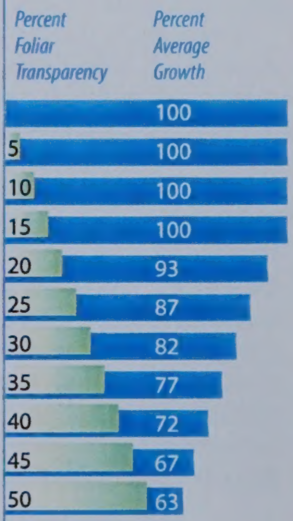
How Is the Crown Indicator Measured? Two people stand – at different angles with the most open views of the crown – one tree-length away from the tree being evaluated. Visual estimates of each crown indicator are recorded in percentage classes (0-5 percent, 5-10 percent, ...95-100 percent) for each tree. Consensus is reached on each indicator using visual guides for standardization.

How Can Crown Indicator Data Be Used?
The crown condition indicator is a good general indicator of tree health and can be used to:

- Monitor visible changes in crown condition
- Relate crown condition to tree growth or resilience to stressors such as insects and diseases.
- Evaluate suitability of stand for wildlife and bird species.
- Provide data to estimate risk of catastrophic crown fires.
- Serve as an indicator of soil fertility and toxicity.
- Serve as an indicator of climate change



Dieback on Softwoods in Northeastern United States. By ecological units, 199 data.



Relationship between foliar transparency and growth of pines. 1993-99 data. Foliar Transparency ≥ 20 percent was associated with reduced growth.

Ozone Injury

What Is the Ozone Injury Indicator? A number of plant species are sensitive to ozone exposures above normal background levels. These bioindicator species exhibit an upper surface foliar injury symptom that can easily be distinguished from other foliar injuries and quantified. Ozone bioindicator species are monitored in all U.S. forests.

Why Is the Ozone Injury Indicator Important? Elevated ozone exposures are an air-quality problem that has great potential to affect human health, as well as forest health and productivity over large areas. Injury to bioindicator plants shows us where ozone exposures in forests are high enough to cause plant injury, and gives estimates of the relative severity of exposures. They also show where the highest probability of reduced growth; reduced resilience to insects, pathogens, drought, and other stressors; and increased mortality might be occurring.

How Is the Ozone Injury Indicator Measured? The ozone indicator is not sampled on FIA plots because specific site and plant species requirements must be met that may not be present on the FIA plot. Ozone biomonitoring sites are located in forest openings where three or more bioindicator species are found. In forests where ozone exposures are very high and sensitive species are common, increased numbers of sites are located. The plants are rated for foliar injury symptoms during the peak of ozone injury (mid-to-late summer), before fall colors mask ozone foliar symptoms. The severity of foliar injury is expressed in an Ozone Injury Score (OIS) – 0 to 4.9 (no or minute injury), 5 to 24.9 (low to moderate injury), and greater than 25 (severe injury). FIA analysts use consecutive 5-year periods with variable ozone exposures, weather, wind flow, and precipitation patterns to examine regional trends in OIS over the long term.

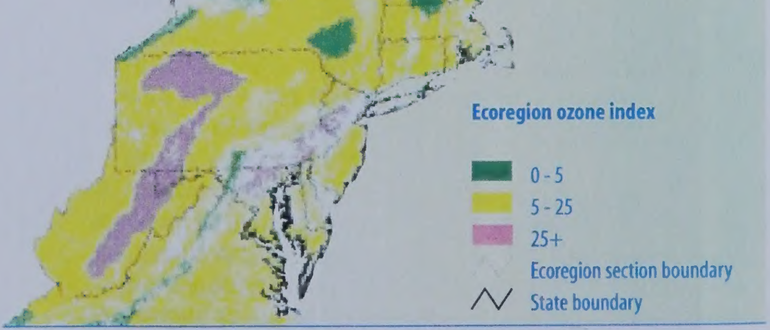
Severe ozone injury on tulip poplar leaf.

PHOTO BY GRETCHEN SMITH

How Can Ozone Injury Data Be Used? Ozone injury data can identify forested areas where ozone exposures are high and where other necessary conditions for injury (e.g., adequate light, nutrition, and moisture) are also present. Ozone injury data can be used to:

- Identify areas in forests where ozone injury is high.
- Relate the severity of ozone injury to changes in growth, mortality, or diversity.
- Relate the severity of ozone injury to increased sensitivity to biotic and abiotic stressors.
- Relate the severity of ozone injury to changes in animals or insects dependent on ozone-sensitive bioindicator species (for example, the Monarch butterfly is dependent on common milkweed, a bioindicator species).

Ozone Index Scores in Northeastern United States. By ecological unit, 1994-99 data.



Tree Damage

What Is the Damage Indicator? The damage indicator is the measurement of the type, location, and severity of injury caused by diseases, insects, storms, and various human activities. Some examples of damages recorded are open wounds, signs of advanced decay, cankers, and broken boles, roots, or branches.

Why Is the Damage Indicator Important? Damage caused by a variety of natural and human-caused sources affects growth and development of trees. Identifying unexpected or unexplained damage is intended to trigger further investigation into causal agents and tree responses. Information from this indicator should help answer questions about roles of biotic and abiotic stressors and how they affect biological conditions and processes within the forest community.

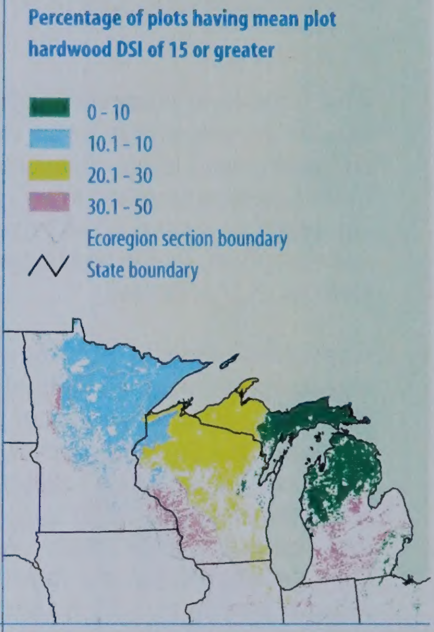
How Is the Damage Indicator Measured? Damage data are collected on all FIA plots. A maximum of two different damages may be recorded per tree. Individual damages are characterized by type or kind of damage, the location on the tree where the damage occurs, and the severity of the damage.

In general, damages are considered more serious when they are found on lower parts of the tree and large areas of tree are affected. Damages must meet minimum thresholds to be recorded. Therefore, zero damage recorded means there were no damages observed that met the minimum injury threshold. Cause or causes of damage are not collected as part of the core damage measurements. Methods for matching causal agents with observed damage and useful data sources are under discussion in FIA.

Open wound on sweetgum tree caused by beavers.

PHOTO BY KENNETH STOLTE

Damage Severity Index (DSI) for hardwoods in the Great Lakes area. By ecological units, 1999 data. Further analysis is needed to define relationships between DSI and growth or mortality.


Percentage of plots having mean plot hardwood DSI of 15 or greater
0 - 10
10.1 - 10
20.1 - 30
30.1 - 50
Ecoregion section boundary
State boundary

How Can Damage Data Be Used? Damage data are collected to:

- Assess the damage severity index (DSI) for each plot. DSIs are calculated from the three damage components: type, location, and severity. In general, a high DSI indicates multiple damages, severe types of damage, and/or a lot of damage occurring near the bottom of the tree. DSI values less than 15 indicate trees with minimal damage that are likely to be a normal occurrence in fairly healthy stands. The DSI results are usually separated by tree species because of the biological differences between species.
- Evaluate what forests or proportions of forests are at risk of reduced growth and/or increased mortality due to the damages observed.
- Determine how the life, development, or survival of the forest is affected by the level of damages observed.

Tree Mortality

What Is the Tree Mortality Indicator? The tree mortality indicator is the number, size, and volume of trees that have died since the previous measurement on an FIA plot. It provides information on whether changes in abiotic or biotic stressors or stand development are creating conditions less favorable for tree growth and survival.

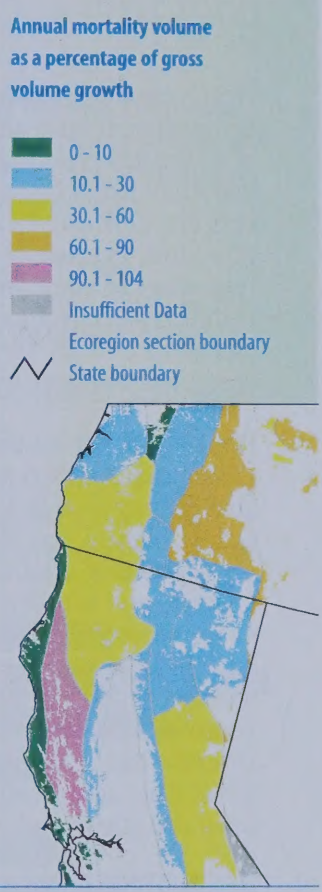
Why Is the Tree Mortality Indicator Important? Mortality is an essential part of all healthy forest ecosystems. It contributes to ecosystem functioning and diversity by creating dead material for nutrient recycling, creating openings that result in mosaics of species and ages, and providing habitat for wildlife. Mortality may also reduce productivity of forests being managed for wood production and increase risk of wildfire. Changes in the rates and amounts of mortality require close scrutiny to separate "normal" or acceptable levels of mortality from unusual or unacceptable levels. Analysis of affected species, their ages, disturbance history in the area, and the cause of mortality are essential information for land managers and policymakers.

How Is the Tree Mortality Indicator Measured? Tree mortality is the measurement of diameter and height of trees that have died on FIA plots from one measurement cycle to the next. The cause of the mortality is recorded when it can be determined.

Mortality data are most meaningful when compared to growth data from the same plots. The volume of trees that died – mortality volume (mv) – is divided by the volume gained in growth (gv) of the live trees. A mv/gv value greater than 1.0 means there was a net loss of wood volume on the plot. A related method compares the average size (diameter) of the trees that have died (dd) to the size of remaining live trees (ld). A dd/ld ratio greater than 1.0 means the average size of dead trees is larger then the average size of living trees.

Port-orford-cedar killed by a root disease in southwestern Oregon.

PHOTO BY TOM IRACI


Annual mortality volume as a percentage of gross volume growth
0 - 10
10.1 - 30
30.1 - 60
60.1 - 90
90.1 - 104
Insufficient Data
Ecoregion section boundary
State boundary

Mortality in southern Oregon and northern California. By ecological units, 1992-99 data. The cause of the high mortality in coastal northern California is currently under review.

How Can Tree Mortality Indicator Data Be Used?

The tree mortality indicator measures a key forest process and therefore has a number of uses. It can identify:

- High mortality areas – FIA plot data can be used with insect and disease survey data to better determine the geographic extent of mortality, track trends, and determine causes.
- Habitat suitability for wildlife.
- Areas of high fuel loading and fire spread risk.
- Carbon cycling patterns.
- Sustainability of stand developmental patterns.
- Climate change.

Lichen Communities

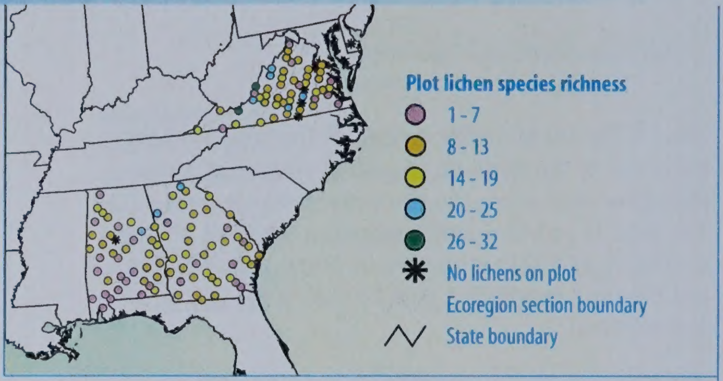
What Is the Lichen Communities Indicator? Lichens are an association of fungi and algae that grow on a variety of substrates including trees. They have a number of important forest functions, including cycling of nutrients and providing forage and habitat for a variety of wildlife. Because of their physiology, lichens are responsive to environmental stresses such as air pollution and climate change, making them useful as indicators of both. They also are indicators of forest ecosystem biodiversity.

Why Is the Lichen Communities Indicator Important? Lichen community composition and changes in composition can provide information about changes in air quality, climate, and biological processes. For example, not finding a pollution-sensitive species in an area where it is expected can indicate the presence or past presence of pollutants. Finding many nitrogen-loving species in an area can indicate high nitrogen deposition, which may also affect other components of the ecosystem, such as water quality. Diversity and abundance of lichens is also affected by forest type, age, density, and spatial arrangement of trees and other vegetation.

How Are Lichen Communities Measured? The indicator has two data collection parts – collecting samples for species identification (to determine number of different species per plot) and estimating species abundance (the number of times each species occurs). Samples are collected from woody plants (conifers and hardwood trees and shrubs above 0.5 meters) and recently fallen trunks and branches. Samples are mailed to an expert for identification. Abundance within the lichen plot is recorded for each species. Other data are recorded to describe the plot such as percent canopy cover, percent gaps, and dominant tree and shrub species. This information is combined with FIA tree data, environmental data, and measures of lichen community composition to suggest causes for variations in the lichen communities.

PHOTO BY BRUCE MCCUNE

Pollution-sensitive lichen, Lobaria pulmonaria.



Lichen richness in Southeastern United States. By plot, 1993-98 data. Analysis and use of gradient models help determine if lower species richness in these States is due to air pollution, climate, forest structure, or other causes. North and South Carolina were measured in 1999; their measurements will expand the analysis in this region.

How Can Lichen Data Be Used? Two main uses of lichen indicator data are determining lichen abundance and diversity and identifying the relationships among lichens, climate, and air pollution. Lichen community data can be used to:

- Determine species abundance and richness by plot.
- Determine regional diversity – number of species recorded in a large region, such as an ecoregion section.
- Develop biotic indexes – indexes based on lichen community data from plots along pollution and climate gradients across large regions. Gradient models have been developed for Colorado and the Southeastern United States. Models for other locations are under development.

Down Woody Debris

What Is the Down Woody Debris Indicator? The down woody debris (DWD) indicator is the measurement of fallen trees, dead branches, and large fragments of wood on the forest floor. Small branches less than 3 inches in diameter are measured as fine woody debris, while larger branches and down trees are measured as coarse woody debris. DWD records the species, shapes, sizes, holes, and stages of decay.

Why Is the Down Woody Debris Indicator Important? Down woody debris is an important element of productive and biologically diverse forests. It is an important component of forest productivity, wildlife habitat, fuel loading, soil erosion, and carbon storage. As DWD decomposes, the soil is enriched with organic matter, nutrients, and moisture. Larger down tree boles provide dens for wildlife. Both large and small debris provide shelter and food for insects; germination sites for tree, herb, and shrub species; a substrate for fungi and microorganisms; and long-term storage for water, carbon, and other nutrients.

How Is the Down Woody Debris Indicator Measured? Three transect lines on each of four subplots radiate out from subplot center and extend to subplot edge. All down wood greater than 3 inches in diameter crossed by the transect line are measured for bole diameter, length, stage of decay, species, and presence of hollow cavities. Fine woody debris is recorded as the number of pieces less than 3 inches in diameter in different size classes. Large piles of coarse woody debris are treated as a unit based on the size and shape of the pile.

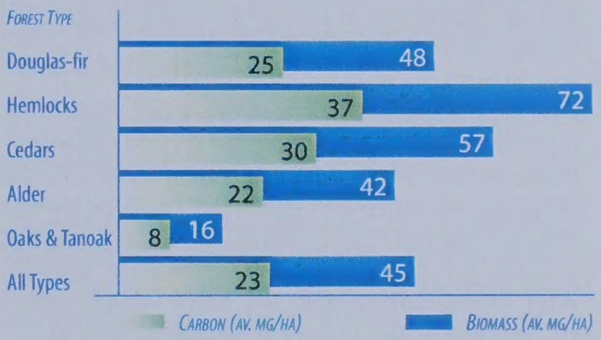
PHOTO BY KENNETH STOLTE

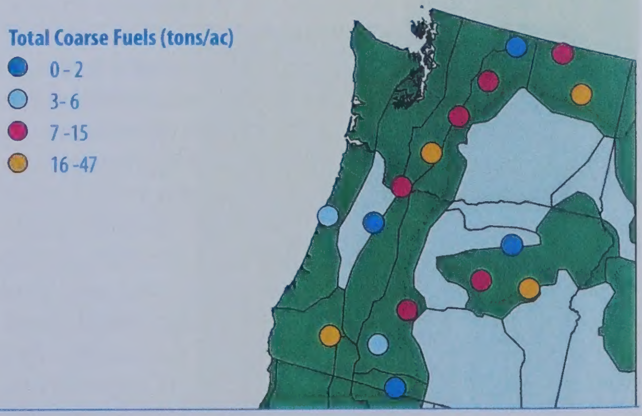
Down logs and smaller woody debris.

How Can Down Woody Debris Data Be Used? DWD data relate to a number of forest ecosystem processes and hence provide multiple and varied uses in analyzing forest health. DWD data can help evaluate:

- Biomass, carbon, and nutrient storage.
- Fuel loading and fire spread – down woody debris fuels can be classed by species groups, state-of-decay groups, and log sizes.
- Wildlife habitat – type and amount of down wood available or used as habitat.
- Soil stabilization.

Biomass and carbon in coarse woody debris in western Oregon.
1991 – 98 data. Average biomass and carbon was highest in hemlock forest types.





Total coarse fuels in Oregon and Washington. *1998 pilot study data. Coarse woody debris is highly variable from plot to plot due to factors such as forest type, climate, and disturbance history.*

Vegetation Diversity and Structure

What Is the Vegetation Indicator? The vegetation indicator measures the type, abundance, and vertical position of vascular plant species on FIA forest health plots. It inventories and monitors the status, changes, and trends in plant species richness and abundance, and the vertical structure of the forest vegetation.

Why Is the Vegetation Indicator Important? The vegetation indicator produces information on native plant diversity; spread of invasive exotic species; fuel loading and fire-spread rates; food and habitat for wildlife; carbon cycling; and the impacts of acid rain, nitrogen deposition, ozone, and climate change effects. It will be useful in evaluating the risk of soil erosion, resistance and recovery from disturbance, and providing data to type plot vegetation by locally defined communities.

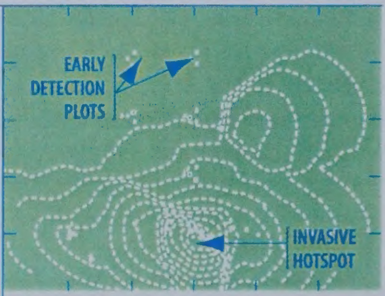
How Is the Vegetation Indicator Measured? Vegetation is measured using a multiple-scale nested approach. All trees, shrubs, herbs, grasses, vines, ferns, and fern allies are identified and quantified on three permanently positioned 1m^2 quadrats on each subplot. The general characteristics of the forest floor, such as litter, moss, bare ground, and rocks are also recorded. The rest of the subplot is then searched for additional species. For each species on the subplot, cover is estimated and the vertical layer (0-2, 2-6, 6-16, >16 ft) where the majority of the foliage occurs is recorded. Unknown species are collected near the plot, then pressed, dried, labeled, and mailed to a qualified herbarium for identification.

PHOTO BY KENNETH STOLTE

Understory plant diversity and vertical layering in a mixed hardwood-pine forest.

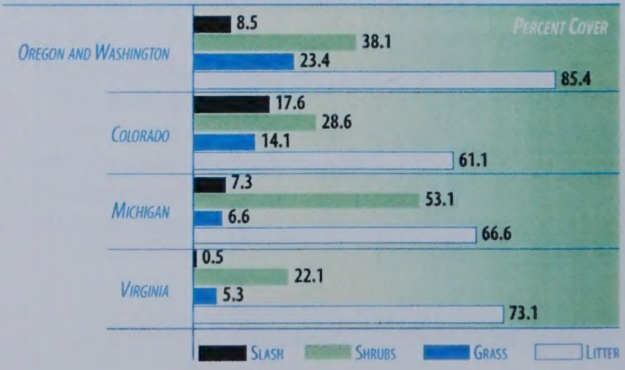
How Can Vegetation Indicator Data Be Used? The vegetation indicator data can be used in many ways. Some of the most common uses will be to:

- Monitor native diversity in the understory.
- Track the spread of exotic invasive plants and impacts on native species.
- Relate vegetation changes to soil chemical and physical changes, ozone exposures, and climate change.
- Evaluate amount, extent, and suitability of wildlife habitat.
- Provide data for fuel loading and fire spread risk.



Spread of invasive species. *1998-99 pilot study data. A model was used to determine the likely origin of invasive species (invasive hotspot) and areas where the species is next likely to spread (early detection plots).*

Fuel abundance by plant type in five States. *1998 - 2000 pilot study data.*



Soil Condition

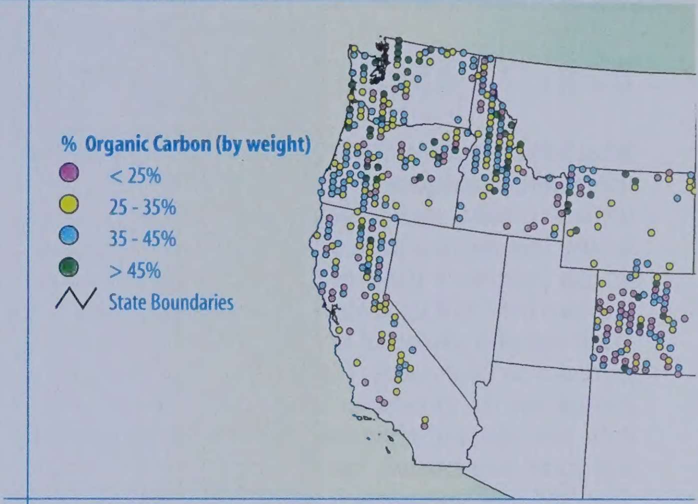
What Is the Soil Condition Indicator? The soil condition indicator is designed to collect data about erosion, compaction, and important physical and chemical soil properties. These data establish baseline values that can be used to characterize soil status on all forest land across the United States, and can be used with subsequent measurements to identify and evaluate change. The chemical and physical properties include nutrient information, such as the amount of exchangeable cations (e.g., calcium, magnesium, potassium, and phosphorus); pH level; carbon and nitrogen; toxics such as heavy metals; and the bulk density (weight of soil per unit volume).

Why Is the Soil Condition Indicator Important? Soils are important to forest land because vegetation depends on the five basic environmental factors that soils provide – nutrients, water, air, heat, and mechanical support. Chemical and physical data provide information about the physical and fertility status of forest soil and are used in many ecological models at different spatial scales of the forest ecosystem, such as in estimates of the forest carbon budget.

How Is the Soil Condition Indicator Measured? Soil measurements are made in both the field and laboratory and are divided into three categories – soil erosion, compaction, and soil sampling. Samples for analysis are collected from the forest floor (litter layer and O-horizon) and from underlying mineral soil in two equal increments down to about 8 inches. These soil samples are analyzed for chemical and physical properties in laboratories.

PHOTO BY BARBARA CONKLING.

Soil sample collection.



Mean organic carbon concentrations in forest floor soils of the Western United States. By plot, 1998 and 1999 data. Plot to plot differences can be caused by climate, forest, and understory vegetation.

How Can Soil Condition Indicator Data Be Used? There are three main components to the data:

- Chemical and physical information—to evaluate characteristics, such as fertility; potential of the soil system to accommodate stressors, such as acid precipitation or heavy metals; bulk density; and carbon. The ability to measure soil carbon content consistently on a national set of forest plots will contribute greatly to current information about how forest soils store and release carbon.
- Soil erosion information—to assess the potential for accelerated erosion in response to management practices or naturally occurring events. For example, the Watershed Erosion Prediction Project (WEPP) model (Elliot and others 2000), currently being evaluated for use with the soils plot data, makes erosion predictions for different forest ages and disturbance types.
- Soil compaction information—to assess the status and changes in the amount of compaction and the type observed, such as ruts, trails, or areas. Compaction can be caused, for example, by repeated passage of heavy machinery or vehicles.

QUALITY ASSURANCE PROGRAM

What Is the Quality Assurance Program? The FIA continuous quality management program is designed to control, correct, and document measurement uncertainty. This process utilizes quality control (QC) and quality assurance (QA) techniques to continually improve field and laboratory measurements. The program includes extensive training, auditing, and timely feedback to field crews. FIA is also working to include the QA process in information management, data analysis, and reporting. The overall QA program has many components, including a carefully planned, executed, and documented training program for each crew member. The training program requires crew members to pass both written and field tests in order to be certified to collect data.

Two main kinds of checks or audits are done during data collection: (1) those done by a qualified QA crew that has the data collected by the field crews and checks it in the field themselves (field crew may or may not be present during the check) and (2) a qualified QA crew performs a complete plot reinstallation and remeasurement of a previously measured plot (field crew is not there and does not know which plot will be remeasured).

Why Is QA Important? The QA checks provide different kinds of information to help improve data collection and to document the quality of the data collected. This information helps FIA analysts determine if data are appropriate for particular analysis techniques and models.

How Are QA Data Used? One use of the complete plot reinstallation and remeasurement data is performance evaluation of the crews. The absolute magnitude of the differences (bias) between field crews and QA crews is compared to measurement quality objectives specified for each measurement. For example, in 1999, the average percent of trees measured that met the measurement quality objectives in all regions for all crown measurements (hardwoods and softwoods) was about 89 percent, with values ranging from 67 percent to 100 percent. These analyses help in data interpretation and in identifying problems in data collection that then leads to solutions.

GLOSSARY

Bioindicator plant – A plant that exhibits a unique, detectable, visible injury response when exposed to a particular stressor.

Core measurements – Measurements that must be made on all FIA plots using the FIA Field Methods Guide procedures.

Ecological unit – An area characterized by similar climate, soils, and topography. Grouped at various spatial scales, such as region, domain, province, section, land unit, and land type.

Exotic species – Nonnative species of plants or animals that often are invasive, competing with native species for space, nutrients, or light.

Forest land – Land that is at least 10 percent stocked by forest trees of any size, including land that formerly had such tree cover and that will be naturally or artificially regenerated.

FIA plot design – A fixed-area plot where most FIA measurements are collected without damage to the plot, and data can be stratified in analysis by forest types, disturbances, etc.

Hardwood – A dicotyledonous tree, usually broad-leaved and deciduous.

Lichen – Nonvascular organism that is a symbiotic combination of a fungus and algae. The fungus attaches to a variety of substrates such as trees, rocks, and soil. The algae get nutrients and water directly from the air and makes sugar for growth of both.

Nonforest land – Land that does not support or has never supported forests, and lands formerly forested where use for timber management is precluded by development for other uses.

pH (soil) – The degree of acidity or alkalinity of a soil.

Quality assurance – The overall system of management activities designed to assure quality data.

Quality control – Operational techniques and activities that are used to control the data acquisition process.

Softwood – A coniferous tree, usually evergreen, having needles or scale-like leaves.

Stressor – An agent that causes a plant to suffer damage or stress or be killed. Stressors can be living (biotic) – such as insects, diseases, mammals, or competing vegetation – or nonliving (abiotic) – such as chemical pollutants or weather extremes.

Tree – An individual of a tree species with a diameter at breast height or diameter at the root collar that is greater than or equal to 5.0 inches.

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National Park Service
Sonoran Desert Network

Casa Grande Ruins National Monument
Coolidge, AZ • Established as a Federal Reserve 1892/National Monument 1918 • 473 acres
Protects the largest known Hohokam structure (ca. 1300) and other archeological sites.

Chiricahua National Monument
Willcox, AZ • Established 1924 • 11,985 acres
Features spectacular rhyolite pinnacles, ranching history (ca. 1900), and Madrean* biodiversity.

Coronado National Memorial
Hereford, AZ • Established 1952 • 4,750 acres
Interprets the 1540-42 Coronado Expedition and preserves Madrean* biodiversity.

Fort Bowie National Historic Site
Bowie, AZ • Established 1972 • 1,000 acres
Preserves ruins of Fort Bowie (active 1862-1894) and commemorates the Chiricahua Apache.

Gila Cliff Dwellings National Monument
Silver City, NM • Established 1907 • 533 acres
Protects Mogollon-culture dwellings (ca. 1300) in a wilderness setting.

Montezuma Castle National Monument
Camp Verde, AZ • Established 1906 • 842 acres
Preserves a five-story Sinagua cliff dwelling (1100-1425) and Montezuma Well.

Organ Pipe Cactus National Monument
Ajo, AZ • Established 1937 • 330,689 acres
Showcases the landscape and biodiversity of the Sonoran Desert, including organ pipe cactus.

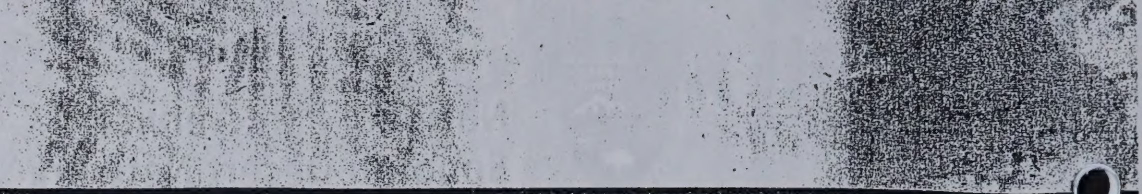
Saguaro National Park
Tucson, AZ • Established 1933 (east) & 1961 (west) • 91,445 acres
Features giant saguaro cacti and life zones from desertscrub up to mixed conifer forest.

Tonto National Monument
Roosevelt, AZ • Established 1907 • 1,120 acres
Preserves cliff dwellings of Salado farmers (1100s-1400s) in a desert-riparian setting.

Tumacacori National Historical Park
Tumacacori, AZ • Established 1908 • 356 acres
Protects three Spanish colonial missions (1691-1848); expanding into gallery riparian corridor.

Tuzigoot National Monument
Clarkdale, AZ • Established 1939 • 58 acres
Preserves hilltop Sinagua pueblo (1100-1425); likely expanding to include adjacent wetlands.

*Read more about "Madrean" on page 3.

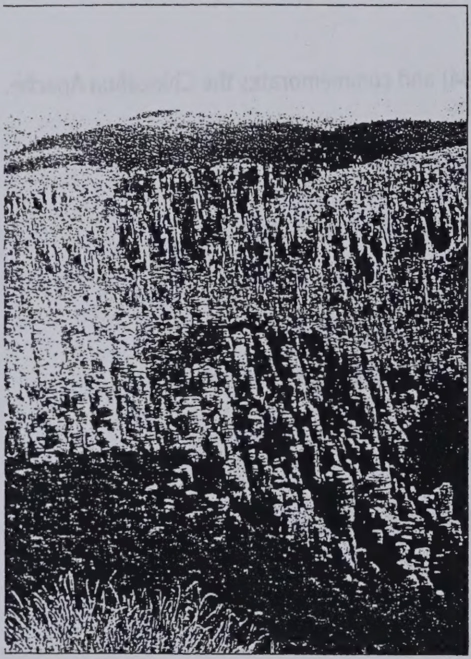


A Tall Order

The 1916 Organic Act established the National Park Service (NPS) and directed it to manage its lands

> *....to conserve the scenery and the natural and historic objects and the wildlife therein and to provide enjoyment of same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.*

The 2001 NPS Management Policies reviews the resources and values that are subject to this standard:

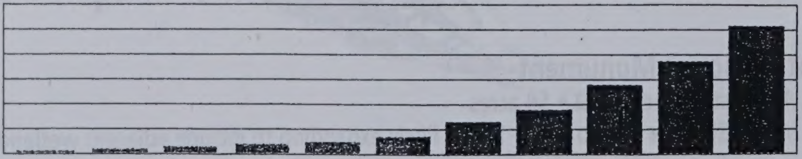


Chiricahua protects unique pinnacles, rich biodiversity, and early ranch-era history.

- scenery and natural landscapes
- native plants and animals
- ecological, biological, and physical processes
- daytime and nighttime vistas
- natural soundscapes and smells
- soils, geological, and paleontological features
- historic and prehistoric sites, structures, and objects

NPS must simultaneously maintain superlative environmental quality across the park system while providing opportunities for the public to enjoy these resources and values. In the Sonoran Desert region, population growth, shifting land uses, and international border issues significantly complicate this responsibility. To do their job, park managers need comprehensive information about:

- the distribution of major biotic and abiotic resources in their care
- trends in the condition of these resources
- threats to the continued health of these resources



Arizona population has risen from 123,000 in 1900 to over 5,000,000 in 2000 (U.S. Census Bureau) .

Infra-red camera captures coatimundi band at Fort Bowie.

Young coati closeup.

Technical Assistance

Not all members of field crews are human–unattended cameras record wildlife presence in remote areas. These devices have documented rare and elusive species and provide other important information, for example, presence of young coatimundis (*Nasua narica*), which confirms breeding in the population. Coatis are tropical species that barely extends into the southwestern United States from Mexico. Visitors to Chiricahua, Coronado, Fort Bowie, and Saguaro may encounter these gregarious raccoon relatives who play important roles in seed dispersal and nutrient cycling.

Don Swann measures a desert tortoise at Saguaro

Inventory and Monitoring

Managers need reliable data to maintain resources "unimpaired for future generations," especially as conditions outside of parks rapidly change. To address information gaps and facilitate proactive resource management, NPS has established a servicewide Vital Signs Inventory and Monitoring Program, composed of 32 "networks" of parks grouped by proximity and ecological similarity.

The initiative covers five key elements:

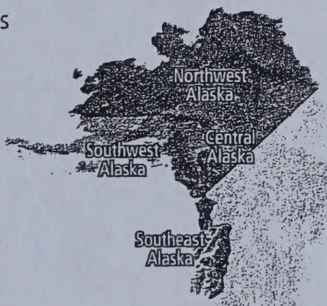
- baseline **inventories** of biological and geophysical natural resources
- long-term ecosystem **monitoring** programs
- digital geographic information that documents distribution of natural resources
- integration of inventory and monitoring results into park management decisions
- cooperation with neighboring agencies to manage resources on a larger scale

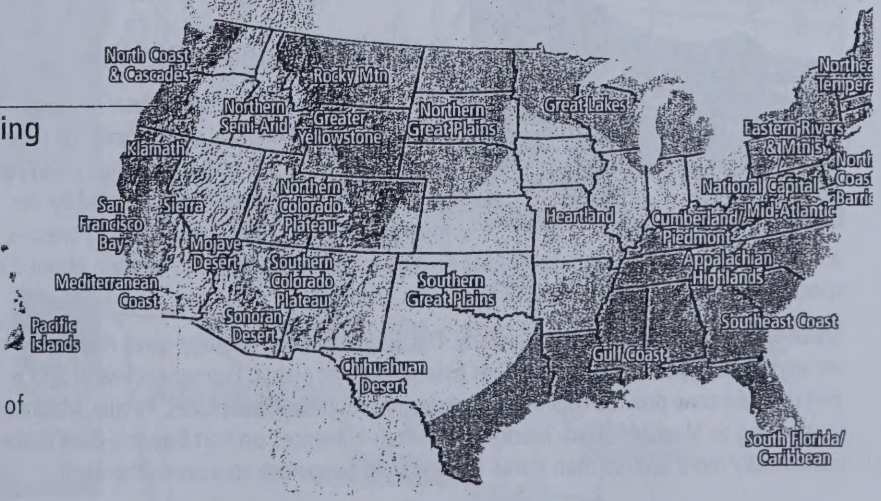
Inventory Monitoring

A natural resource **inventory** is an extensive, point-in-time survey of the location and condition of plants, animals, and abiotic environment (water, soils, and air). It forms the basis for **monitoring**, which adds the dimension of time. The goal of the NPS Inventory and Monitoring Program is to identify trends in resources that potentially direct management actions or trigger new lines of inquiry.

Beyond Park Boundaries

Monitoring distribution of the desert tortoise *(Gopherus agassizi)* has driven home the need to consider parks in the context of surrounding landscapes. Desert tortoises are wide-ranging animals; an adult female tortoise radio-tracked at Saguaro's Rincon Mountain District traveled 15 miles south to the Santa Rita Mountains. During the course of this dispersal and subsequent return to the park, researchers helped her across a rail line and an interstate highway after detecting movement patterns that indicated she was unable to cross these barriers.


Northwest Alaska
Central Alaska
Southwest Alaska
Southeast Alaska


North Coast & Cascades
Rocky Mtn
Northern Semi-Arid
Greater Yellowstone
Northern Great Plains
Great Lakes
Northea
Tempera
Eastern Rivers & Mtn's
Nort
Coas
Barri
Klamath
San Francisco Bay
Sierra
Northern Colorado Plateau
National Capital
Heartland
Cumberland/Piedmont
Mid-Atlantic
Mojave Desert
Southern Colorado Plateau
Mediterranean Coast
Southern Great Plains
Appalachian Highlands
Pacific Islands
Sonoran Desert
Southeast Coast
Gulf Coast
Chihuahuan Desert
South Florida/ Caribbean

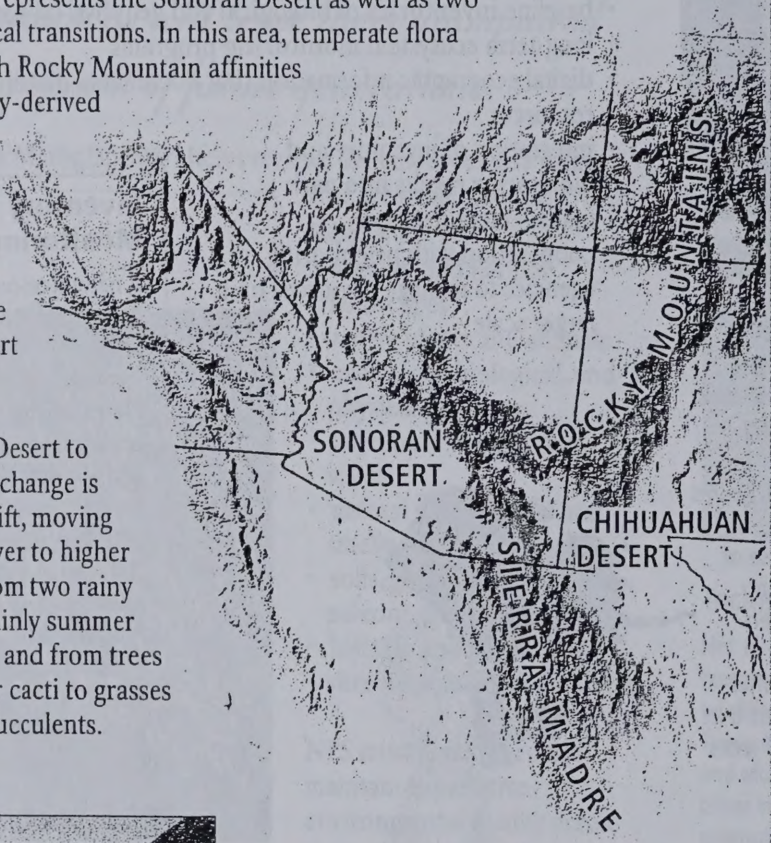
NPS Inventory and Monitoring Program

The Sonoran Desert Network is one of 32 networks of national parks that constitute the NPS Vital Signs Inventory and Monitoring Program. Networks encompass nearly 300 parks representing all major biomes of the United States.

The Sonoran Desert Network Setting

The Sonoran Desert Network covers a geologically and biologically diverse region. The western half of the network lies in the warm, 100,000 square-mile Sonoran Desert proper that extends into five states in the U.S. and Mexico: California, Arizona, Baja California, Baja California Sur, and Sonora. The higher-elevation eastern half is “sky island” country, where discrete mountain islands emerge from desert grassland seas.

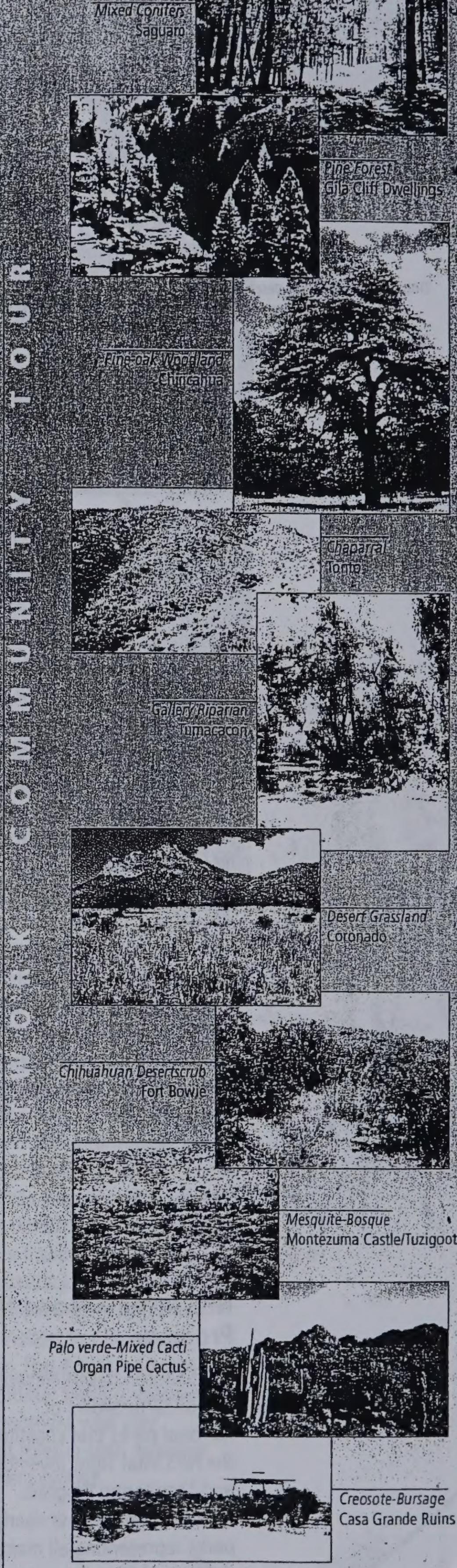
The network represents the Sonoran Desert as well as two biogeographical transitions. In this area, temperate flora and fauna with Rocky Mountain affinities meet tropically-derived species from the Sierra Madre to the south. Also in the region, the Sonoran Desert to the west meets the Chihuahuan Desert to the east. This change is based on a shift, moving east, from lower to higher elevations, from two rainy seasons to mainly summer precipitation, and from trees and columnar cacti to grasses and smaller succulents.


SONORAN DESERT
ROCKY MOUNTAINS
CHIHUAHUAN DESERT
SIERRA MADRE

Unexpected Species Richness

The 1000-acre Fort Bowie National Historic Site hosts more plant species and vegetation types than might be expected based on area and range of elevation. Surveys in the 1980s and by the inventory crew in 2002 identified 473 species, and typically such an area in southeast Arizona might be expected to contain about 330 species.

Three factors contribute to this diversity. The area’s complex geology gives rise to a variety of soil types that host different assemblages of plants. Permanent water and a wet riparian zone provide habitat for species not found in drier places. Finally, Madrean (pertaining to Mexico’s Sierra Madre Occidental) influences on Fort Bowie’s flora make it intrinsically more diverse than floras derived from temperate sources to the north.


TWORK COMMUNITY TOUR
Mixed Conifers
Saguaro
Pine Forest
Gila Cliff Dwellings
Pine-oak Woodland
Chiricahua
Chaparral
Tonto
Gallery Riparian
Tumacacori
Desert Grassland
Coronado
Chihuahuan Desertscrub
Fort Bowie
Mesquite-Bosque
Montezuma Castle/Tuzigoot
Palo verde-Mixed Cacti
Organ Pipe Cactus
Creosote-Bursage
Casa Grande Ruins

The plant community diversity represented across the Sonoran Desert Network reflects a range in elevation from 1400 to 8700 feet. Above is a snapshot tour through the 11 parks showing the changes in vegetation along an elevational gradient.

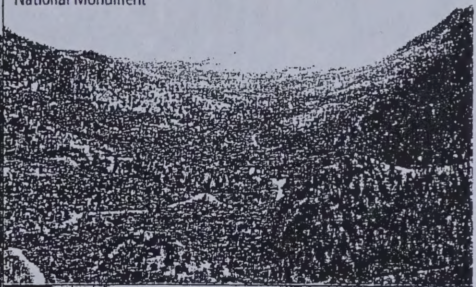
Sonoran Desert Network

Gila Cliff Dwellings
National Monument

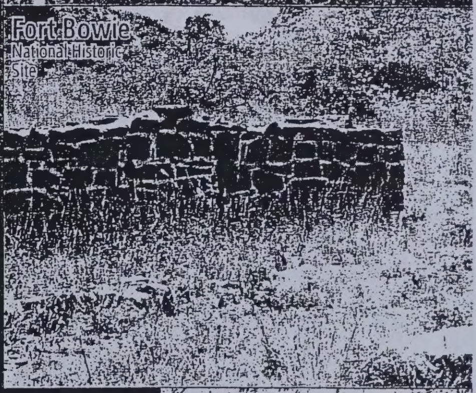
Casa Grande Ruins
National Monument

Tuzigoot
National Monument

Organ Pipe Cactus
National Monument

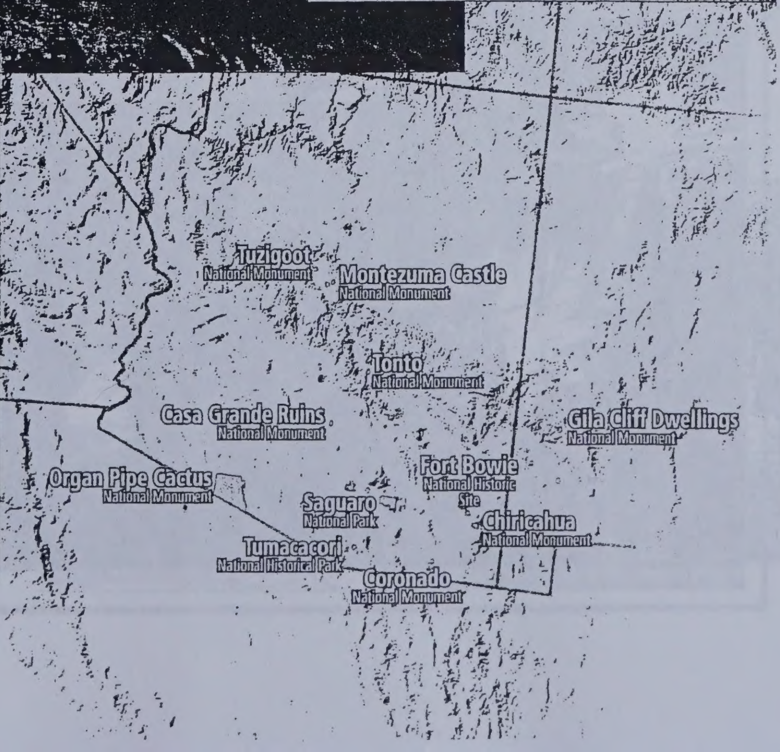


Coronado
National Monument

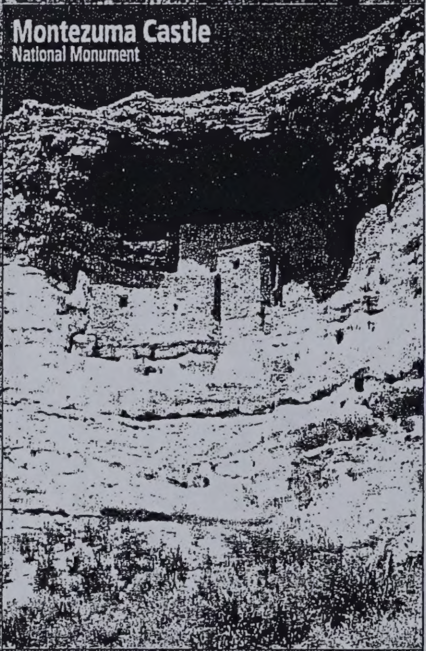


Fort Bowie
National Historic Site

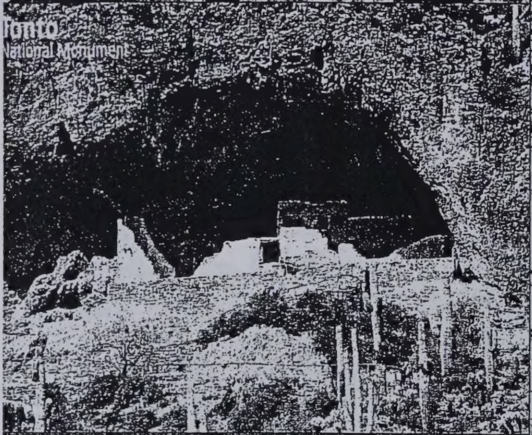
Tumacacori
National Historical Park


Tuzigoot
National Monument
Montezuma Castle
National Monument
Tonto
National Monument
Casa Grande Ruins
National Monument
Gila Cliff Dwellings
National Monument
Fort Bowie
National Historic Site
Organ Pipe Cactus
National Monument
Saguaro
National Park
Chiricahua
National Monument
Tumacacori
National Historical Park
Coronado
National Monument

Saguaro
National Park



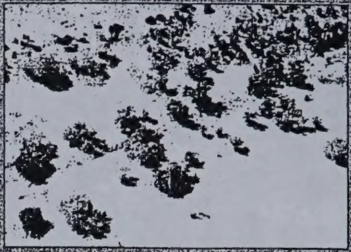
Montezuma Castle
National Monument



Tonto
National Monument

Chiricahua
National Monument

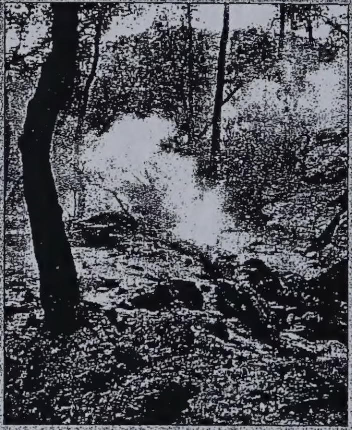
REGIONAL MONITORING CHALLENGES



Coronado National Memorial informal trails

Cross-Border Traffic

Network parks are coping with huge increases in illegal cross-border traffic. The southern boundary of Organ Pipe Cactus and Coronado is the U.S.-Mexico border, and Chiricahua, Fort Bowie, and Tumacacori are sufficiently close to draw some of this traffic. Border crossers are leaving more than footprints. Trash and informal trails degrade once pristine landscapes. A goal of the Sonoran Desert Network Inventory and Monitoring Program is investigating the effects of waves of off-trail travelers on ecological communities.



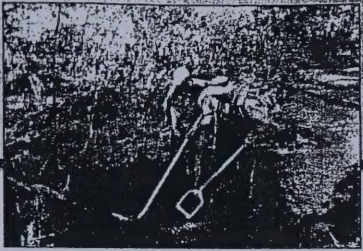
2002 Picket Park burn Chiricahua National Monument

Monitoring Effects of Fire

Network parks must prepare plans to guide all fire management activities. Data about effects of fire on plants, animals, and other resources are crucial to safe, ecologically sound actions.

Network parks are also planning for fire with their neighbors.

Chiricahua, Gila Cliff Dwellings, and Saguaro are working with the Forest Service, and Fort Bowie is cooperating with Bureau of Land Management. Coronado is a participant in a regional fire planning collaboration that includes several federal and state agencies, non-government organizations, and private land owners. All of these programs are continuously fine-tuned using the results of fire effects monitoring and fire research projects.



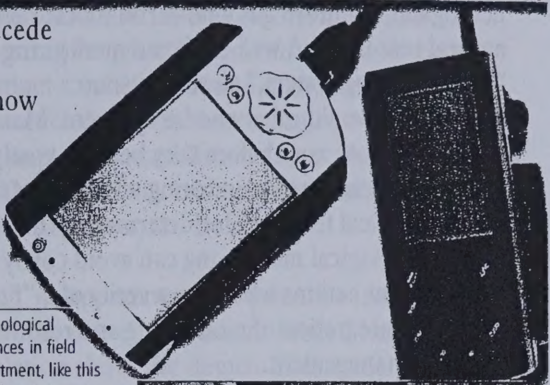
Biologists surveying for fish in the Santa Cruz River, Tumacacori expansion area.

Fish Story

Inventory crews continue to find rare species in new locations. Just beyond Tumacacori proper an abandoned meander channel retains its downstream connection with the Santa Cruz River. Alluvial groundwater seeping into the channel forms a short tributary stream and may be similar to the original "Tumacacori spring" that inspired establishment of the nearby mission in 1691. Working with a neighboring land owner, the biologists found the endangered Gila topminnow (*Poeciliopsis occidentalis occidentalis*) on this stream. This discovery increased the interest of both the property owner and NPS in adding the parcel to the park and helped lead to legislation expanding the park. The public, the park, the property owner, and the fish all benefit from this arrangement. Inventory biologists have also documented a high density of rare yellow-billed cuckoos (*Coccyzus americanus*) in the same location.

State-of-the-Art Inventories

Accurate inventories precede successful biological monitoring—we must know what we have before we can assess its condition. Since March 2000, NPS cooperators at the University of Arizona have compiled a wealth of data on the plants and animals in the Sonoran Desert Network. In addition to completing species lists for all the parks, this nationally-recognized program has also tested protocols for the future monitoring program, mapped the distribution and abundance of a wide range of species of special management concern, and created important partnerships with parks. The project has combined innovative sampling techniques, rigorous protocols, and quantifiable results into a leading-edge effort that sets the stage for long-term monitoring.

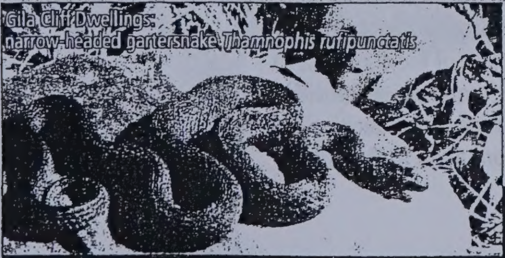


Technological advances in field equiptment, like this global posistioning device, keep monitoring projects on the cutting edge of science and technology.

Measuring a brush mouse *peromyscus boylii* at Saguaro

EXTRA ADDED ATTRACTIONS

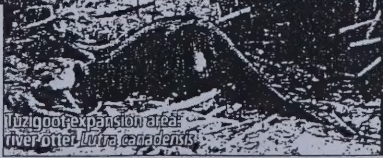
The Sonoran Desert Network Inventory Program has added numerous species to park lists.



Gila Cliff Dwellings:
narrow-headed gartersnake *Thamnophis rufipunctatis*

Tonto:
Virginia's warbler *Vermivora virginiae*

Tumacacori expansion area:
Gila topminnow *Poeciliopsis occidentalis occidentalis*



Tuzigoot expansion area:
river otter *Lutra canadensis*

Casa Grande Ruins:
night-blooming cereus *Peniocereus greggii*

Developing the Science of Monitoring

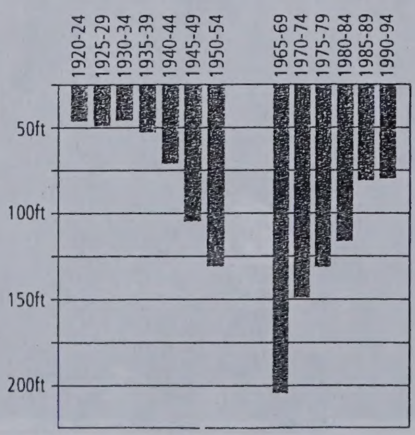
Ecological monitoring is a powerful tool for effective management of natural resources. A well-designed monitoring program can serve as an "early warning system," alerting resource managers to potential threats before they would otherwise be apparent. Management efforts can then focus on these issues before they become costly and intractable problems. Continued monitoring after the management response can provide critical feedback for determining the effectiveness of the action. Finally, ecological monitoring can avoid costly and unnecessary management actions when the severity of a "problem" is actually quite low. This integration of monitoring and resource management is called adaptive management.

Monitoring a Scarce Resource

Sonoran Desert national parks preserve the legacy of those who came before. The construction sites of the past were often located near important water sources. Tuzigoot, Montezuma Castle, Tonto, Organ Pipe Cactus, Saguaro, and Tumacacori contain some of the most precious desert waters in the region. In partnership with the Water Resources Research Center at the University of Arizona, the Sonoran Desert Network has initiated water quality monitoring to keep park managers alerted to threats and changes to this critical resource.

Montezuma Well at Montezuma Castle.

Where the Gila River sustained the Hohokam people 1000 years ago, modern humans now manipulate regional hydrology. Mean water level (shown with standard error, from Arizona Department of Water Resources and USGS measurements) near Casa Grande Ruins National Monument shows remarkable decline then recovery over an 80-year period. In the last decades of the 20th century, a series of unusually wet years, land use shifts from irrigated agriculture to residential development, and delivery of Colorado River water to the area via the Central Arizona Project canal contributed to decreased well depths. Such repeated measurements of natural resources through time are an essential management tool. Recent work suggests that surface subsidence resulting from future accelerated groundwater pumping could risk collapse of Casa Grande ("Great House") the monument's 700-year old centerpiece structure.



Direction from Congress

In its fiscal year 2000 appropriation, Congress emphasized that the preservation of America's national parks units should be as high a priority in the NPS as providing visitor services and stressed that:

> *A major part of protecting [important] resources is knowing what they are, where they are, how they interact with their environment and what condition they are in.*

These words capture the essence of inventory and monitoring.

Ecological Monitoring of Regional Landscapes

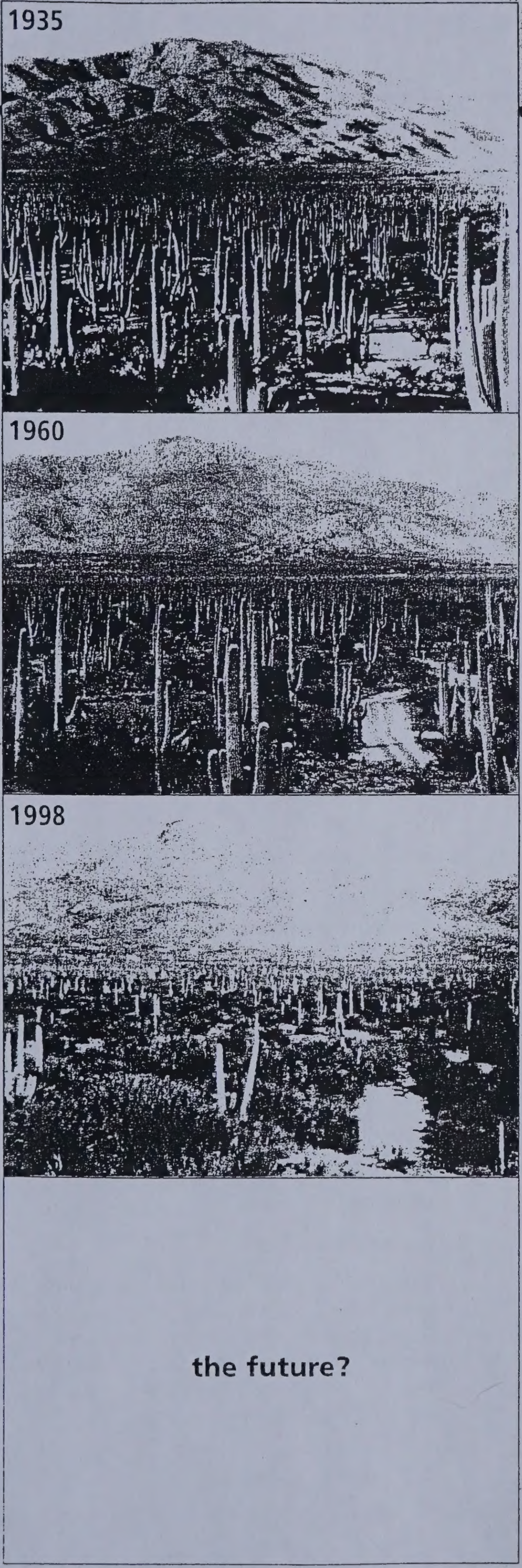
The Sonoran Desert Network is partnering with professionals from universities, agencies, and non-profit organizations to expand its peer-reviewed park ecological monitoring framework. This coordinated approach creates a plan for bi-national, cooperative ecological monitoring of the Sonoran Desert region. Monitoring at this level will enable researchers to detect regional trends and facilitate production of a periodic State of the Sonoran Desert Report. This assessment of the condition of natural resources will provide critical support for decision making and information to the public.

Learning from the Past, Preparing for the Future

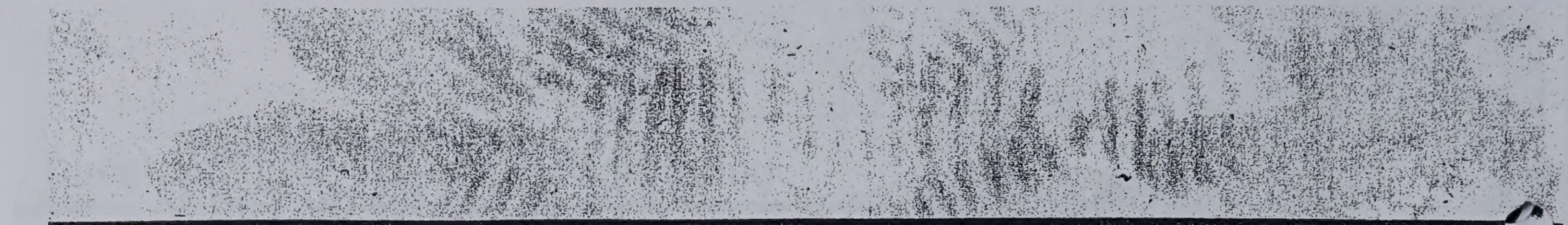
The Sonoran Desert Network Inventory and Monitoring Program documents trends in the condition of valuable, and in many cases, irreplaceable, park resources. Saguaro National Park, for example, was established east of Tucson, Arizona in 1933 to protect its majestic namesake cactus, unique to the Sonoran Desert.

In 1963, an apparent saguaro decline led to addition of a west unit where populations looked healthier. Speculation about the demise of eastside plants implicated disease, frost, wood-cutting, poaching, and livestock grazing. Ecological studies later showed the cactus forest was aging naturally and susceptible to periodic deep freezes. Researchers installed saguaro study plots in 1941 and 1990 that have yielded important life history data and found a 35% increase between 1990 and 2000 due to favorable environmental conditions. Although current efforts have helped researchers understand the natural population fluctuations, continued tracking is essential for understanding how human-caused environmental change may affect saguaros in the future.

As human alteration of all landscapes increases in scale and intensity, diligent monitoring will help managers increase the likelihood that the resources and values present in our national parks will indeed stand the test of time.



Saguaro National Park, Rincon Mountain District, view toward Agua Caliente Hill.



Acknowledgements

The Sonoran Desert Network Inventory and Monitoring Program thanks the following people and organizations for their guidance and assistance:

The dedicated staff of the 11 NPS units of the Sonoran Desert Network

Mike Britten, Inventory and Monitoring Coordinator, NPS Intermountain Region; *Kathy M. Davis*, Superintendent, Tuzigoot and Montezuma Castle national monuments; *Larry Laing*, Natural Resources Manager, NPS Southern Arizona Office; *Larry Norris*, Research Coordinator, Desert Southwest Cooperative Ecosystem Studies Unit; *Terry Sprouse*, Senior Research Specialist, University of Arizona Water Resources Research Center

Arizona-Sonora Desert Museum, Sonoran Institute, Sonoran Desert Network Board of Directors, NPS Washington Office Inventory and Monitoring Program

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Page 2. Coatimundi at Fort Bowie: *remote camera, UA inventory group*; Coatimundi closeup: *Kitty Pokorny*; Chiricahua: *Brooke Gebow*

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Page 4. Fort Bowie ruins: *Ethan Stapp*; Casa Grande creosote: *Brian Powell*; Organ Pipe cactus: *Brian Powell*; Tonto chaparral: *Roy Averill-Murray*; Fort Bowie desertscrub: *Ethan Stapp*; Coronado bunchgrass: *Dave Bly*; Montezuma Castle-Tuzigoot riparian: *Steve Sandell*; Chiricahua oak: *NPS*; Gila Cliff Dwelling ponderosa pine: *Barry Nielsen*; Saguaro Douglas-fir: *Don Swann*

Page 5. Gila Cliff Dwellings: *Brian Powell*; Casa Grande Ruins: *NPS*; Tuzigoot: *NPS*; Organ Pipe Cactus: *Brian Powell*; Coronado: *Larry Norris*; Fort Bowie: *Ethan Stapp*; Tumacacori: *Larry Norris*

Page 6. Saguaro: *Brian Powell*; Tonto: *Gabe Martinez*; Montezuma Castle: *Larry Norris*; Chiricahua: *Gabe Martinez*; Coronado trails: *Mark Hardin*; Picket Park burn: *Brooke Gebow*

Page 7. Fish surveying: *Eric Albrecht*; mouse measuring: *Eric Albrecht*; Gila topminnows: *Dennis Caldwell*; narrow-headed garter snake and night-blooming cereus: *Cecil Schwalbe*; Virginia's warbler: *Will Turner*; river otter: *Doug Von Gausig*

Page 8. Montezuma Well: *NPS*

Page 9. Saguaro National Park, view toward Agua Caliente Hill: *Unknown* (1935); *James R. Hastings* (1960); *Ray Turner* (1998); baby saguaros: *NPS*

All spot photos, background photos and graphics by *Dennis Caldwell*

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June 2004, Perry

Fluid Minerals Development
From Land Use Planning to Final Reclamation Monitoring

Overview

Fluid minerals development consists of many stages, including:

- Land Use Planning/Environmental Review;
- Leasing;
- Permitting & Environmental Review;
- Exploration, Development, & Production;
- Inspection and Enforcement
- Abandonment & Reclamation.

Objective

To provide an overview of how the **Fluid Minerals** development process works, from the creation of leasing allocations in the Land Use Plan to monitoring final reclamation.

Land Use Planning (Refer to: Land Use Planning H-1601-1; Planning for Fluid Minerals H-1624-1; and 43CFR Part 1610 Resource Management Planning)

- The BLM's resource allocations and decisions are documented in a Resource Management Plan (RMP)/Environmental Impact Statement (EIS), which incorporates compliance with the National Environmental Policy Act (NEPA).
- During alternative formulation, areas of high, moderate, and low fluid mineral potential are identified, as well as wildlife and visual values, and other resource considerations or concerns.
- During alternative analysis, these issues are weighed, conflicts resolved, and decisions proposed that will achieve a balance of resource uses and values within multiple use principles.

RMPs establish: (43 CFR 1601.0-5 (k)

1. **Desired Outcomes**
   a. Also known as Desired Future Conditions, Management Objectives, Goals and Standards.
   b. Outcomes guide resource uses and related levels of production or use over the planning area.
2. **Allowable Uses and Actions to Achieve Desired Outcomes**
   a. Areas Open or Closed to Leasing (Land Use Planning H-1601-1, Appendix C)
      - Open subject to the Terms and Conditions of the standard lease form.

  - Open subject to “major” constraints (no surface occupancy).
  - Open subject to “minor” / “moderately restrictive” constraints (seasonal/timing limitation, controlled surface use).
  - Closed to leasing because resource values cannot be protected with even the most restrictive stipulations (no leasing). Closures may be based on existing law, land use planning decisions, special designations, or administrative, Congressional, or Presidential withdrawal actions.

b. Leasing Stipulations (Land Use Planning H-1601-1, Appendix C)
  - Establish authority for substantial delay, site changes, or denial of operations that amend the terms of the lease contract.
  - Site-specific requirements that go beyond the lease form standard terms and conditions and agency regulations.
  - Stipulations must have Exception, Waiver, and Modification criteria.
  - The least restrictive constraint to meet the resource protection objective should be used.

c. Reasonably Foreseeable Development Scenario (RFD)
  - Use RFD estimates to assist in comparing and evaluating environmental impacts of foreseeable future fluid mineral development under each EIS Alternative analyzed in the EIS. The original RFD should be the most optimistic for development, as it assumes no restrictions on use other than existing withdrawals and standard lease terms. Discussion of impacts should not be limited to “numbers of wells.”

d. Geophysical Exploration (Land Use Planning H-1601-1, Appendix C)
  - Determine whether the RMP oil and gas leasing and development decisions also apply to geophysical exploration.

Do new land use plan constraints and requirements apply to existing leases?

“The plan or plan amendment must explain how, if at all, identified leasing, exploration, development, production and abandonment constraints or requirements will be applied in areas currently under lease.” (H-1624-1,IV,C1)

BLM is required (43CFR1610.5-3(b)) to “take appropriate measures, subject to valid existing rights” to bring operations and activities under existing permits, contracts, etc… into conformance with the approved RMP. New requirements of land use plans may be imposed through conditions of approval on all future development approvals, including future drilling applications and subsequent operations for existing wells and fields. The extent to which requiring conformance with the approved RMP is consistent with valid existing lease rights depends on the extent to which the conformance would:
1. Constrain or restrict development beyond the measures anticipated or authorized by the lease terms or regulations; 2. Interfere with the lessee’s opportunity to economically recover the oil and gas resource

BLM State Office Consistency Review of Land Use Plans:

The BLM State Office conducts reviews at each planning stage to ensure that, to a reasonable extent, draft, proposed, and final RMPs within the State are consistent with BLM State and National Progra Guidance and that inconsistencies with other RMPs within the State are justified.

State Government Consistency Review:

The Governor of the State also reviews the Proposed RMP/Final EIS to ensure consistency with State plans.

The Lease Sale

BLM conducts a review to ensure the action of issuing the lease is in conformance with the terms, conditions, and decisions in the land use plan prior to offering the parcels for competitive lease sale.

- The State Office forwards nominated parcels to the Field Offices for review prior to posting the Notice of Sale for competitive leasing.
- The Field Offices check to ensure proper lease stipulations are carried forward from the land use plan to the lease.
- The Field Offices use the Documentation of NEPA Adequacy (DNA) process (WO-IM-2001-062) to determine whether new information or changes occurring since the RMP/EIS was written would warrant additional NEPA analysis. Such analysis would be employed to determine whether to impose new or modified lease stipulations or withhold the parcel from sale. If conditions warrant, an RMP lease stipulation may be waived or modified without additional NEPA analysis provided the RMP waiver or modification criteria are met. Waivers and modifications should be documented in the DNA.
- The State Office attaches the appropriate stipulation(s), if any, to the lease parcels. Lease notices may also be attached to the lease parcels to remind operators of other requirements that may result in restrictions during APD approval.
- The parcels and associated stipulations and notices are subject to 45-day public review prior to the competitive sale.
- Parcels are offered for sale at the quarterly (or more frequent) lease sale.
- Parcels not sold at the competitive sale become available for noncompetitive leasing for a 2-year period. If a lease is sold noncompetitively, the State Office should ensure the stipulations advertised on the Competitive Sale List remain appropriate for lease issuance.

Pre-Application Meeting

The Pre-application meeting is becoming increasingly important. Applicants and the BLM field staff should meet prior to the filing of a Notice of Staking (NOS) or Application for Permit to Drill (APD) to share information and ensure streamlined permitting procedures.

The BLM meets with the operator in the field or in the office to:

- Discuss in broad or specific terms, the company's future development plans for the area including wells, roads, utilities, and production facilities.
- Discuss BLM's management goals and objectives for the area, sensitive resources, and potential mitigation measures.
- Discuss Standard Operating Practices for the development area.

The Permitting Process (Oil and Gas Onshore Order No. 1)

There are two APD permitting process options available to the Operator:

1) APD Process: The operator submits the APD to the BLM and then meets onsite with the BLM to review the application, especially the Surface use (13-point) Plan.

- In the case of split-estate, (i.e. fee, State, or other Federal Agency surface underlain by Federal minerals) the surface owner/manager is invited to attend the onsite inspection. BLM, the surface owner/manager, and the operator discuss resource issues and how they relate to road, pad, utility, and production facility location and design. At the onsite meeting, BLM may inform the operator of potential conditions of approval and may discuss relocating the road or well location to protect other resource values.

2) Notice of Staking/APD Process: The Notice of Staking process offers the advantage of an onsite meeting to work out operational issues before the APD is submitted.

- The BLM and operator discuss mitigation measures and BLM encourages the operator to incorporate recommended mitigation measures and Best Management Practices into the APD submission. This allows the operator to submit a more complete APD, which in turn simplifies APD processing and review and can result in accelerated permit approval.

Common to both: The Notice of Staking or APD is posted for 30 days.

BLM Receives an APD

An APD is evaluated to ensure the proposal conforms to objectives and decisions in the RMP and to weigh approval options in a multiple use context. The BLM conducts its evaluation, or analysis, through the NEPA process.

The APD NEPA PROCESS (NEPA Handbook H-1790-1)

In general, oil and gas exploration and development actions that are expected to have a "significant" impact are analyzed through the Environmental Impact Statement (EIS) Process. Actions not expected to have a "significant" impact, are analyzed through the Environmental Assessment (EA) Process and should be tiered to and in conformance with the RMP/EIS. Actions adequately addressed in an existing EIS or EA may be evaluated in the Documentation of NEPA Adequacy (DNA) process.

The EA and EIS for oil and gas exploration and development have several parts in common:

1. Purpose and Need:

- Why does the operator want to drill the well?

2. Proposed Action:

- What has the operator proposed?
- The proposed action may include applicant-offered mitigation.

3. *Alternatives:*
   - Are there other ways to develop the mineral resource with less environmental impact?
   - Reasonable (technical and economic) alternatives to the operator's proposal may be analyzed to achieve plan conformance and reduce environmental impacts.

4. *Affected Environment*:
   - What resources are in the area that could be affected?

5. *Environmental Impacts:*
   - What are the environmental consequences of the Proposed Action and each Alternative?
   - BLM discloses and evaluates the Environmental Consequences/Cumulative Impacts of the Operator's proposal and any Alternatives.

6. *Consultation and Coordination:*
   - Which agencies and interest groups has the BLM coordinated with?

7. *Finding of No Significant Impact:*
   - Can BLM issue a Finding of No Significant Impact?
   - If not, an EIS is required or the project must be modified to enable BLM to reach a FONSI.

8. *Decision Record for an EA or Record of Decision for and EIS:*
   - BLM issues a decision to either approve the APD as submitted, approve the APD with mitigation measures (Conditions of Approval (COAs)), or to deny the proposal.

Through the NEPA process, the BLM may determine that it is practical or necessary to grant an Exemption, Waiver, or Modification to a lease stipulation.

Old Lease - New Information

If BLM is reviewing an APD for an area covered by an old lease...

- What new information or changed circumstances, since the lease was issued, need to be considered in the NEPA analysis for the APD? Does BLM need to place more restrictions on the APD or can we grant "exceptions" to the current lease stipulations? Consider…..
  - Has there been a new RMP or Amendment with new requirements for the area?
  - Has a Field Development environmental analysis been completed?
  - Is the urban interface encroaching on fluid mineral development, or vice versa?
  - Have there been additional species listed under the authority of the Endangered Species Act, or species delisted?
  - Has a new Scenic Byway or Special Recreation Management Area been designated in the area?

- BLM can use conditions of approval to move the well location more than 200 meters in distance, restrict the project more than 60 days, or require other reasonable measures to minimize adverse impacts (43 CFR 3101.1-2 Surface use rights; Lease Form 3100-11, Section 6) protect sensitive resources, and to ensure compliance with laws, regulations, and land use plans.

- However, BLM restrictions on development must be consistent with lease rights granted…
    - Whenever possible, negotiate mitigation options with the operator and obtain the operator's concurrence.
    - To comply with statutory or regulatory mandates (law or regulation), such as the Endangered Species Act, BLM must take or require any actions that are necessary to satisfy the mandate of the law. Such mandatory actions are consistent with lease rights granted because lease "Rights granted are subject to applicable laws…" (Lease Form 3100-11, Last Section, Page 1).
    - To comply with nonstatutory and nonregulatory requirements (policy, directives, plan decisions), such as conformance with the requirements of a new RMP or taking actions to minimize adverse impacts, BLM may impose greater restrictions when less stringent measures would be ineffective and the new measures do not render the recovery of fluid minerals infeasible or uneconomic.
    - In both cases, BLM should evaluate less stringent options and document the analysis in the EA or EIS.

EXPLORATION, DEVELOPMENT, and PRODUCTION:

- BLM performs periodic compliance inspections to ensure that the terms and conditions of the approved APD are implemented.

-The inspector needs to be familiar with the requirements of the approved APD and the resources in the area BLM is trying to protect.

-The inspector must have reasoned judgment, the ability to negotiate changes or action by the operator, and the ability to enforce the APD requirements.

-Compliance also includes "monitoring"- (Were BLM's mitigation requirements effective? If not, what changes are needed?)

BLM performs the following Operations inspections as time and staffing allow:

- Prior to surface disturbance, to record baseline conditions.
- During construction, to ensure surface disturbance is within the limits established in the APD.
- During drilling, to ensure a safe and clean operation.
- During production, to ensure a safe and clean facility and to account for mineral production.

ABANDONMENT and RECLAMATION:

The "reclamation stage" is one of the most critical. Success or failure here determines how the site will "look and perform" for many years to come. A damaged landform or mismatched vegetation will attract unwarranted attention and reduce forage and habitat for a long, long time.

- BLM's approval to abandon & reclaim is required.

- For newer wells, the Reclamation Plan is a part of the approved APD.

- In the case of older wells, the operator proposes an Abandonment Plan (Reclamation Plan) for BLM's review and approval. (Lease Form 3100-11, Section 6, 2nd Paragraph)

-Partial reclamation of drilling areas may occur during production.

-The goal of final reclamation is to re-establish native vegetation and restore the landform to its natural character.

BLM performs the following Abandonment and Reclamation inspections as time and staffing allow:

- Prior to reclamation, to discuss reclamation requirements. (In the case of split-estate, include the surface owner/manager input).
- During abandonment and reclamation, to ensure the well is being properly plugged and reclamation is being completed correctly.
- Following reclamation, to ensure the site is properly recontoured, topsoil is returned to the disturbed areas, and seed is sewn.
- 1, 2, 3 or more years following reclamation to ensure the site is stable and revegetating. When BLM determines that the site is fully reclaimed (recontoured, vegetated, weed free, junk free, and stable), BLM will approve the Final Abandonment Notice.
- BLM monitors the site over the long term to ensure the site maintains its stability and ecosystem function is fully restored.

Monitoring and Evaluating the Effectiveness and Necessity of Lease Stipulations and Application for Permit to Drill (APD) - Conditions of Approval (COAs)

Adaptive Management & Monitoring

Adaptive Management is a system of management practices based on clearly identified outcomes. Monitoring identifies whether management actions are meeting expected outcomes, and, if not, facilitates management changes that will best ensure that outcomes are met. Adaptive management recognizes that early knowledge about resource systems is sometimes uncertain. Monitoring designed for adaptive management must increase our resource knowledge and result in appropriate adjustments in project activities, Best Management Practices, APD Conditions of Approval, and lease stipulations.

Predict – Mitigate – Implement – **Monitor** – Adapt

Monitoring Lease Stipulations and APD Conditions of Approval (COAs)

Lease Stipulations and COAs must be periodically evaluated for necessity and effectiveness through an ongoing monitoring program. Monitoring can be conducted in-house, by the operator, by organizations, through contract, or any combination, provided it meets BLM requirements.

What are the basic components of monitoring?

- Indicators and Thresholds–
  - Establish a set of "indicators" you will monitor.
    For example: With reclamation monitoring, you may monitor soil stability by checking for rill erosion, or vegetation composition by looking for invasive, nonnative plants. Consider identifying the indicators and thresholds in the APD COAs.
  - Establish "thresholds" or boundaries not to be crossed, for your indicators. For example: The threshold for reclamation soil stability may be the requirement that at final abandonment, rill erosion does not exceed 1 inch in average depth and rills are not continuing to deepen. When monitoring identifies a threshold that is crossed, it is time to draw conclusions and make changes.

- Trend –
  - Monitoring "Trend," or the progression of ecological change, is important for determining the effectiveness of on-the-ground management actions resulting from lease stipulations and APD - COAs.
    For example: Are reclaimed well locations restored to a point where the biological systems are functioning and natural succession is able to occur unimpeded? With new development in the area, is the population of a species stable, decreasing, or increasing?

Adaptive Management Concept Paper
April 2004

Background

The concept and practice of adaptive management (AM) has taken on increased emphasis in recent years. Historically, environmental management was based upon the paradigm of predict, mitigate and implement. This approach can be, burdensome, costly, and time consuming, and often produces debatable results. Rarely is there follow up to ensure that the predictions were correct and that the mitigation measures were effective. The complexity of ecosystems in which we operate, constantly and unpredictably changing environmental conditions, changing practices and treatments, lack of complete information, and the need for immediate actions, dictates a different approach based upon the new paradigm of predict, mitigate, implement, monitor and adapt.

There is an extensive body of literature on the subject of AM. The focus of the literature is on the science of AM rather than how to incorporate AM concepts into regulatory decision-making. Many land management agencies and some Bureau field offices are beginning to incorporate AM concepts into land use decisions. However, at this time the Bureau has not formally defined AM and has no policy or direction for integrating AM concepts into land use decisions. This has led to an inconsistent application of AM practices throughout the Bureau.

Early in 2003, the Bureau initiated an effort to develop policies and procedures to integrate adaptive management into the NEPA and planning processes. This paper outlines the current state of that effort and makes policy recommendations for proceeding to that conclusion.

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The Challenge- It can be argued that the Bureau has a long history in AM. Whether it be changing the permitted use on a grazing allotment based upon monitoring data, or amending a land use plan to consider a new type of land use, the Bureau has adapted actions based upon new information or new proposals. Historically, this change in action required reinitiating the decision-making process with new analysis, new decisions and in many cases plan amendments. The challenge is to **efficiently and effectively employ the NEPA and planning processes to address actions and make decisions that may subsequently be modified in light of monitoring or other new information** so that one need not reinitiate the process.

Office of Environmental Policy Review Guidance- The Office of Environmental Policy Review has recently issued OEPC ESM03-6 providing initial guidance to all Interior agencies on implementing AM practices in NEPA compliance. While this guidance does not provide specifics on process and procedures for integrating AM into the NEPA and planning process, it does formally define AM as:

> *"...a system of management practices based on clearly identified outcomes, monitoring to determine if management actions are meeting outcomes, and, if not, facilitating management changes that will best ensure that outcomes are met or to re-evaluate the outcomes." (OEPC ESMO3-6)*

Assumptions

The recommendations in this paper are based upon the following assumptions.

1. The underlying objective in adopting AM is to better achieve desired outcomes by supporting changes or modifications in management actions without reinitiating the planning/NEPA process.

2. The key to achieving that underlying objective is outcome or performance based decisions.

3. The key to performance-based decisions is clearly defined, measurable performance standards.

4. Measuring performance standards requires a firm commitment to long term monitoring.

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As previously stated, the Bureau has a long history of changing management actions in light of new information or new proposals. However, those changes generally come as a result of new analysis, new decisions and oftentimes plan amendments. The intent in developing new policies and procedures is to enhance our decision-making capabilities. The traditional "prescriptive" decision does not easily lend itself to change within the framework of the planning and NEPA processes. Since prescriptive decisions are about specific actions, the analysis is limited to that action and provides the decision maker limited flexibility to change decisions within the existing planning and NEPA documentation. Actions should be viewed as a means to achieve outcomes rather than the plan decision. Outcome or performance based decisions focus on the desired outcome rather than the means to achieving the outcome. Since an outcome or performance based decision might be subject to varying interpretations, to be meaningful it must also contain performance standards which define how and when the outcome is considered to be achieved.

For example, a traditional Bureau plan might have a decision that calls for no surface occupancy within 2 miles of a raptor nest, a very prescriptive, action based decision. An outcome or performance based decision might be to maintain a thriving population of raptors. Success in achieving that outcome might be based upon specific population numbers, a defined number of nests per area and a specified fledgling rate. While no surface occupancy may ultimately result in thriving populations as defined by these performance measures, it does not ensure it and it is not a true reflection of what the land manager wants to achieve.

Why Adaptive Management? There are a number of reasons for adopting an AM approach to decision-making. Among them are:

1. To enhance ability to achieve plan outcomes
2. To get the most out of the NEPA/Planning process

3. To provide plan flexibility
4. To validate impact predictions, ensure mitigation is effective, adapt for unintended consequences

Ultimately, the plan outcome is paramount. AM policies and procedures must enhance our ability to achieve outcomes. The rigid nature of traditional prescriptive plan decisions is not the most effective means of achieving desired outcomes in all cases. Should the prescriptive actions not lead to the desired outcomes, additional analysis, new decisions and plan amendments are required. The NEPA/planning process is a powerful tool to aid the decision maker and inform the public. When the NEPA/planning process is effectively used and mechanisms are built into the decision to validate impact predictions, ensure mitigation is effective, adapt for unintended consequences, the plan will have the flexibility to enhance the ability to achieve plan outcomes.

Recommendations

The following recommendations provide the policy framework for developing procedural guidelines to integrate AM into the NEPA and Planning process.

When should AM be employed? Not all plan decisions or projects lend themselves to AM decision-making. The policies and procedures for employing AM must define clear criteria outlining on which decisions or projects AM may be employed. This "filter" should be employed at each step of the NEPA/planning process to ensure that the criteria are being met.

AM decision-making should be limited to those situations where **all** of the following conditions are met. Where all of these conditions are not met, proposed decisions should be changed, reconsidered or modified to satisfy traditional planning requirements to most effectively manage the public lands.

1. The decision is outcome/performance based and defined by performance standards.

   As stated in the Assumptions section, the key to AM is outcome or performance based decisions. If the decisions cannot be written as an outcome or performance based decision with clearly defined and measurable performance standards, then AM should not be employed.

2. The actions to achieve the outcome can be adapted based upon monitoring or other new information.

   If there are not alternative actions to achieve the outcome based plan decision then AM should not be employed.

3. The effects of the action are unknown or uncertain due to incomplete information about resource conditions or development scenarios or potentially changing or new practices and treatments.

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For example, limited experience in assessing impacts of development of coal bed methane fields or limited baseline air quality information in an area where actions may affect air quality.

4. There are firm funding and workload priority commitments to conduct monitoring.

   Effective implementation of AM is heavily dependent upon a long-term commitment to detailed monitoring. Without monitoring of performance standards, performance based decisions are meaningless. AM should not be employed without defining how those commitments will be honored. Absent funding and resources to honor the monitoring commitment, proposed decisions should be changed, reconsidered or modified; or plan decisions should be written with traditional prescriptive decisions as a fallback to most effectively mange the public lands

5. The land use plan decisions control the outcome.

   AM should only be considered in situations where management actions resulting from the land use plan decisions have effective control over the outcome. For example, in the situation where BLM manages a small acreage surrounded by private land and the plan applies only to BLM managed lands, the management actions on the private lands more than likely have a controlling influence on the outcome on the public lands; therefore, AM should not be employed.

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AM should be employed at the plan, activity or project level if all of these conditions are met.

How Should AM be Applied?

1. Scoping

> c. In *carrying out initial public participation in the NEPA evaluation process, bureaus should strive to ensure public input into and understanding of the principles of adaptive management. (OEPC ESMO3-6)*

Consideration of AM should begin at the scoping phase. Scoping provides the opportunity to initiate the plan or project-long dialogue with the public. The public should be made aware as early in the process as possible that AM may be employed. Additionally, scoping provides the public the opportunity to identify issues and outcomes and possibly suggest AM applications. Application of the AM filter during scoping may rule out the use of AM in some cases.

2. Development of Plan and NEPA Analysis

> *a. As part of the NEPA evaluation process, bureaus should make a determination of environmental effects of a project and identify the mitigation needs along with other permitting and regulatory requirements. The NEPA analysis should also indicate where data are lacking and uncertainty exists with respect to the intended outcomes and the significance of this lack.*
>
> *b. Monitoring designed for adaptive management must be able to result in appropriate adjustments in project activities as the project is constructed and planned mitigation is installed. This monitoring needs to be built into the project and considered in the NEPA analysis and documentation. . (OEPC ESMO3-6)*

If, after the application of the filter criteria, it appears that AM is the appropriate approach, the plan and supporting NEPA documentation must reflect that choice. The proposed plan must identify potential decisions as desired outcomes with clearly defined, measurable performance standards defining those outcomes. The NEPA documentation must analyze the impacts of a range of actions to achieve those outcomes and identify mitigation measures to ensure that the actions achieve the outcomes. In the case of potentially conflicting outcomes, the plan must identify, and the NEPA document must analyze, a process for resolution of those conflicts. The plan must identify the indicators that will be used to evaluate performance standards and lay out the monitoring plan including methodologies, protocols, funding and timeframes that will be employed to gather data necessary to evaluate if the outcome is being achieved. The plan must identify, and the NEPA document must analyze, the post decision responses, "if this, then what", related to monitoring observations. The plan must describe the process that will be employed to change or modify initial actions to achieve outcomes if evaluation of monitoring data indicates the need for change. It must identify the continuing role of the public in the post decision AM process. It must identify factors for determining when additional NEPA review is needed.

3. Plan Approval and Implementation

The Record of Decision or other appropriate decision document and Final Plan, in the case of a land use plan, will be issued identifying the outcome or performance based decision and performance standards defining that outcome. Management actions addressed in the plan and analyzed in NEPA to achieve that outcome will be implemented.

4. Monitor Indicators

> *d. Bureaus should maintain open channels of information to the public and affected regulatory and permitting agencies during the application of adaptive management, including transparency of the monitoring process that precedes adaptive management and the decision-making process that implements it. This involves: (a) identifying indicators of change, (b) assessing monitoring activities for accuracy and usefulness, and (c) making changes in tactics, activities and/or strategies. . (OEPC ESMO3-6)*

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After implementation of the management actions designed to achieve the outcomes, monitoring in accordance with the identified monitoring plan is conducted. Monitoring data is collected, analyzed and interpreted as prescribed in the monitoring plan and a report prepared. Volunteers or other public land users may provide additional monitoring information. Communication with the public during the monitoring phase, including public disclosure of the monitoring results, will be in accordance with the provisions prescribed in the monitoring plan.

5. Evaluation

After the appropriate monitoring as prescribed in the monitoring plan, the monitoring data is evaluated against the performance standards established in the plan. Were thresholds exceeded? Is the outcome being achieved? Is adaptive management triggered? What is the cause for not achieving the outcome? What is the appropriate action to take to achieve the outcome? Was that action analyzed in previous NEPA? Is supplemental NEPA required? Communication with the public during the evaluation phase in accordance with the monitoring plan is essential.

6. Adapt

e. Bureaus should provide post-activity opportunity for public and affected outside agency review of adaptive management practices, including practices that were exceptions to any resource management plans or that had permitting and other regulatory requirements not satisfied by prior coordination. (OEPC ESMO3-6)

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Where evaluation of the monitoring data demonstrates that the performance standards are not being met and the outcome not achieved, a change or modification in management actions may be warranted. In some cases, evaluation of monitoring data may indicate the need for change of the outcome-based decision, which would require reinitiating the NEPA/planning process. Where evaluation of the monitoring data shows that the outcome based decision is still valid but that the outcome as defined by the performance measures is not being achieved, a change or modification in management actions is warranted. To the degree that those changes have been analyzed in the original NEPA document, no additional NEPA should be required. If those changes have not been previously analyzed, supplemental NEPA will be required. Adoption of new management actions may require changes in the monitoring plan.

Summary Conclusions In summary, the proposed policies outlined in this paper provide the framework for developing more specific procedural guidance on integrating AM into the NEPA and planning processes. These proposed policies are a significant departure from traditional NEPA/planning practices in many respects; however, at this point it is believed that these policies can be implemented without changes to current NEPA/planning regulations.

In summary, the key policy statements proposed in this paper are:

1. The underlying objective in adopting AM is to enhance the ability to achieve outcomes.

2. The ability to achieve outcomes is enhanced when one can make changes or modifications in management actions without reinitiating the planning/NEPA process.

3. The key to making changes or modifications in management actions without reinitiating the planning/NEPA process is outcome or performance based plan decisions.

4. The key to performance-based decisions is clearly defined, measurable performance standards.

5. NEPA analyzes alternative actions to achieve the outcomes and possibly alternative outcomes.

6. Actions to achieve outcomes are not plan decisions.

7. Alternative actions that have been analyzed can be employed to achieve an outcome without amending the plan so long as outcome is unchanged.

8. A plan must contain all the essential elements to be considered an AM plan: performance based outcomes, performance standards, indicators, monitoring plan, “if this than what”.

9. AM can be used on any plan, activity or project so long as the filter is employed and criteria met.

10. AM should not be used on any plan, activity or project unless all filter criteria are met.

11. Public involvement is an essential element of all BLM actions. The process dictates the appropriate level, nature and timing of public involvement.

Ongoing Efforts There are currently approximately forty ongoing planning efforts across the Bureau which have adopted some elements of AM. Each of the efforts differs in its approach to AM. In most cases, consideration of AM did not begin at the scoping phase and has not been carried through the draft and final NEPA documentation. At this stage in the planning processes, it would not be possible to fully incorporate the approach proposed in this concept paper into these planning efforts. It is recommended that these plans continue on the current schedule. It is recommended that at a minimum, these plans clearly outline what actions are subject to modification, how those actions were or will be analyzed, what the indicators of change are or how they will be determined, how monitoring will be conducted or how it will be determined how monitoring will be conducted, and how change will be implemented when warranted by evaluation of monitoring data.

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Draft – Not for Release (March 5, 2003)

In Reply Refer To:
1620 (210) P

Instruction Memorandum No. 2002-00X______
Expires: 09/30/2003

To: AD's and AFO's

From: Assistant Director, Renewable Resources and Planning

Subject: H-1601-1, Land Use Planning Handbook, Integration of Land Health Standards into Land Use Planning

Program Area: Land use planning

Purpose: To provide additional guidance regarding the integration of Land Health Standards into land use plans as required in H–1601–1, Land Use Planning Handbook and H-4180-1, Rangeland Health Standards.

Background: Land Health Standards describe the attributes of healthy, functioning landscapes which in turn provide the basis for sustainable use today and for generations to come. Maintaining healthy lands that provide for multiple and sustainable levels of development and use is at the core of BLM's mission as described in the Federal Land Policy and Management Act and other authorizing statutes. Both the Department of the Interior and BLM Strategic Plans reflect this goal of maintaining and restoring land health and productivity. To achieve this goal, it is imperative that the goal be integrated into BLM land use plans and decision-making processes along with other multiple-use goals, such as social/economic goals, resource use goals and goals for management of cultural and heritage resources..

The Land Use Planning Handbook (H-1601) establishes direction for implementing land use planning requirements, including incorporating land health standards within land use plans. H- 1601 requires that land health standards be incorporated into all new land use plans and into all existing land use plans through maintenance, amendment, or revision. It also requires that land use plans "identify how land health standards are to be considered in relationship to the management prescription for, and uses and activities occurring on, public lands." Furthermore, it states that "land use plans must identify the actions needed to achieve desired outcomes, including actions to restore and protect land health."

Information on establishing, assessing, and monitoring land health standards is contained in the Rangeland Health Standards Manual Section and Handbook (H-

4180). H-4180 defines land health standards as “expressions of levels of physical and biological condition or degree of function required for healthy lands and sustainable uses”. Standards for the health of rangeland ecosystems have been developed and approved for nearly all states. These standards at a minimum address 1) watershed function, 2) nutrient cycling and energy flow, 3) water quality, 4) habitat for special status species, and 5) habitat for native plant and animal populations and communities. H-4180 acknowledges the need for developing additional standards for assessing the health of non-rangeland ecosystem types, such as forests or aquatic ecosystems. This IM provides additional direction and guidance for the integration of land health standards into land use plans and for applying land health standards to all program areas.

Policy/Action:

- All new, revised, or amended land use plans should use existing land health standards as the basis for developing broad land health goals for all lands and activities within the planning area. National Environmental Policy Act documents associated with land use planning should reflect these goals throughout various sections of the Environmental Impact Statement or Environmental Assessment.

- Specific objectives, methods, activities and timeframes for achieving these goals may vary across the alternatives. Trade-offs in levels of achievement among the many mission goals, including the land health goal, both spatially and temporally, will be necessary. The planning process is well designed to assess and disclose these trade-offs to facilitate balanced land use allocation decisions in the context of multiple use and sustainable development principles.

Conventionally, "goals" are different from "standards," as defined in the planning hand book and elsewhere. However, the rangeland and land health "standards" recently developed by the states and incorporated into RMPs were generally written more like "goals" describing conditions to be achieved for functioning rangeland landscapes. Therefore, for land use planning purposes, rangeland and land health “standards"should be considered as land health "goals"and factored into the planning process according to this Instruction Memorandum.

To provide a level of consistency necessary to achieve land health goals across large landscapes, and develop land use plans that are easy to read and understand by the public, all new, revised, or amended land use plans should use existing land health standards as the basis for developing broad land health goals for all lands and activities within the planning area. Land health goals must be specific enough to allow the development of measurable management objectives to achieve the goals. These goals will generally remain constant across all alternatives, however specific objectives, methods, activities and timeframes for achieving these goals may vary across the alternatives.

Specific objectives in the alternatives articulate the varying levels of achieving land health goals. This allows balanced land use allocation decisions to be made in the context of multiple use / sustainable development principles. There are several Mission Goals within the goal category of "Serve Current and Future Publics" and two Mission Goals within the goal category of "Restore and Maintain the Health of the Land" as established in the BLM Strategic Plan. With ever increasing demands on limited natural resources for both Use and Protection for current and future generations, trade-offs in levels of achievement among the many mission goals, both spatially and temporally, are necessary.

National Environmental Policy Act documents associated with land use planning should reflect these goals throughout various sections of the Environmental Impact Statement or Environmental Assessment (See attachment 1). The indicators applicable to each standard are components whose characteristics can be used to determine the land health conditions assessed by a interdisciplinary team in the field. Where possible, use the information about the indicators to describe the existing resources in the NEPA document, and to develop quantifiable objectives in the Land Use Plan. These indicators should then become the basis for monitoring achievement of both the land health standards, and the land use plan objectives.

If, during the land use planning process, modifications are proposed to rangeland health standards previously approved by the Secretary of the Interior or new standards are proposed, the proposed, modified or new standards must be forwarded to the Secretary as described in H-4180- 1. Where additional land health goals or indicators are included in the land use plans, no Secretarial approval is required.

Timeframe: This policy should be implemented fully for all new land use plans and to the extent possible on all on-going land use plan efforts.

Budget Impact: None

Manual/Handbook Sections Affected: This IM provides clarification for guidance outlined in BLM Manual 1601, Land Use Planning, and H-1601-1, Land Use Planning Handbook.

Coordination: This IM has been coordinated with AD-200, AD-300, WO-100, and WO-170.

Contact: Ann Aldrich, Group Manager, Planning, Assessment and Community Support (202) 452-7722.

Attachment 1

Suggestions for Incorporating Land Health Goals and Objectives into RMPs/EISs

The following information is provided as guidance for incorporating land health goals and related objectives into Resource Management Plans and associated NEPA documents. It is formatted to coincide with the typical chapters of the Environmental Impact Statement which accompanies RMP development.

Introduction - In the decision criteria, state how the alternatives will be evaluated, including how well they meet the various goals, including land health goals, minimize conflicts between goals and addresses issues.

Alternatives - For each alternative, describe a compatible mix of goals, objectives, management actions and land uses. Connect the management actions to specific goals and objectives as much as possible. Use the alternatives to apply the range of management actions at different intensities and different locations; find as much common ground, minimize as many conflicts and achieve as many goals as possible. Goals, objectives, management actions and land use allocations for a particular alternative need to be developed in a coordinated, integrated manner that recognizes the influence of the resource uses on goals and objectives and visa versa. Objectives and actions must be realistically achievable and consistent with the intent of the alternative. Describe how land health goals will be used for reclamation standards for resource uses, where appropriate.

Affected Environment - Describe current resource conditions and trends to understand the issues and environmental effects and provide the context for the goals and objectives. Describe all resources and resource uses referenced in any goal or objective at the appropriate scale. Often, this discussion is most helpful at a broader, regional scale rather than at the site specific, local level. Such an approach generally requires the use of broad scale data rather than local, site-specific information. Where possible, use the indicators developed along with the land health standards to describe current land health conditions.

Effects - Describe the degree to which the management actions in each alternative will achieve the goals and objectives; will the action lead to effects that move us towards or away from the goals, including the land health goals, and objectives at the local level; at the watershed level; at the regional level? How long will the effects last?

ROD - Describe the goals, objectives, management actions and land use allocations selected. Rationale should address the extent to which the decision achieves the goals and objectives and addresses the issues as well as the other decision criteria. If any portion of the selected alternative would not achieve land health goals or result in significant progress toward achieving those goals, the ROD should acknowledge this situation and provide appropriate rationale.

Monitoring - Describe requirements for monitoring progress in achieving objectives and establishing if the desired outcomes (goals) are being achieved. For monitoring progress towards achieving land health objectives, focus on key indicators. Describe adaptive management options if monitoring or other information indicates that goals are not being achieved (adjust goals, objectives or management actions).

Implementation - All NEPA documents for activity level project planning are currently required to include a statement of plan conformance, including how the project is consistent with the decisions of the approved plan. This discussion could include reference to the various resource condition and multiple use goals.

In Reply Refer To:
7000/1600(220)

Instruction Memorandum No. 2003-
Expires: 09/30/2004

To: All SD's; Assistant Directors; Director, Office of National Landscape Conservation System; Director, National Science and Technology Center and Director, National Office of Fire and Aviation

From: Director

Subject: Identification of Priority Sub-Basins for Resource Protection and Restoration

DD: 07/03/03
12-31-03
03-31-04
03-31-05

Program Area: This Instruction Memorandum (IM) covers all of the BLM Programs within the management of lands and resources and the O&C. It also covers health and safety, including fire and fuels risks. This IM supplements the 4180 Rangeland Health Standards and Guidelines Handbook for Conducting Watershed-based Land Health Assessments issued by WO IM-2001-079, January 25, 2001.

Purpose: This IM transmits the initial selection of the Priority Sub-Basins (PSB) for resource protection, including conservation and restoration objectives. The identification of PSB will allow field offices to: 1) prioritize data collection, 2) conduct assessments and land health evaluations on a priority basis, and 3) implement conservation and restoration actions, where these actions are needed most. This IM requires each State office to identify a lead and send the name of the lead to Steve Borchard via email (Steven_J_Borchard@blm.gov) by **July 3, 2003.** The lead will be responsible to serve as a point of contact and to coordinate the review of the mapping effort and the initial selection of PSB (see http://ncsd3arc1.corp.blm.gov/website/psip) and submit consolidated feedback to the Washington Office (WO) by **December 31, 2003.** In addition, the lead will also be expected to participate in a number of conference calls with the WO during the review process. This IM requires the WO to carefully evaluate and consider the State feedback on the initial selection(s), the data provided by the States, and the rationale presented to support State recommendations when preparing final approval of PSB. It also requires each State to complete the delineation of watersheds by **March 31, 2004** and the identification of priority watersheds by **March 31, 2005**.

Background: The BLM FY 2000-2005 Strategic Plan requires the BLM to assess the condition of public lands within 150 priority sub-basins and to implement actions to: (1) reduce fuel hazards, (2) control the expansion of invasive species, (3) restore riparian and terrestrial habitats, with priority given to those supporting threatened and endangered wildlife and fish, (4) increase the use of native plants in restoration/rehabilitation, where practical, (5) achieve and maintain an ecological balance for 15 % of the wild horse and burro Herd Management Areas, (6) remediate 375 abandoned mine land sites, (7) achieve an upward trend in the condition of BLM-administered uplands in watersheds within PSB, (8) achieve proper functioning condition or an upward trend on BLM-administered riparian/wetland areas in watersheds within PSB, and (9) to implement water quality improvement prescriptions on BLM lands in watersheds within PSB that do not meet State or Tribal water quality standards.

Selection of PSB and watersheds will help direct resource protection and restoration efforts in support of the BLM priority: "To Improve the Health and Productivity of the Land to Support the BLM Multiple-Use Mission." PSB will complement rather than compete with other BLM priorities such as, Land Use Planning efforts, Wildland Urban Interface vegetation treatment objectives and the National Energy Plan and will facilitate the integration of workloads and focus multiple program efforts. Budget justifications for FY04 and FY05 include goals and strategies which focus funding and activities on PSB and watersheds. In addition, the draft DOI Strategic Plan includes several outcome goals that depend directly on PSB and watershed identification.

Ultimately, the PSB process will identify areas where BLM will focus funds to accomplish integrated objectives consistent with the BLM Strategic Plan. The WO has initiated identification of PSB so that: (1) identification of priority watersheds within priority sub-basins will be consistent, (2) funding can be directed to accomplish integrated objectives, (3) progress can be tracked and accomplishments displayed, and (4) results can be monitored. Periodically, new information and restoration activities and successes will be reviewed to determine if PSB designations need to be modified.

Efforts in FY 2001 to map PSB used criteria that were identified in the Annual Performance Plan and generally examined sub-basins which had data on several geographic information system (GIS) themes including; forest and rangeland health, species conservation (particularly special status species), wild horse and burro appropriate management levels, public health and safety, and impaired surface waters.

Review of specific data themes determined that only 9 of the themes had adequate national scale data to be utilized in the prioritization process. The 9 data themes were overlaid and the number of overlapping themes in a sub-basin was tallied to determine the priority of the sub-basin. For example, the sub-basins of highest priority have 7 or 8 overlapping themes while lower priority sub-basins have 2 or fewer overlaps. Therefore, the 9 equally weighted data themes (and the aforementioned criteria) were used in combination to identify the initial 153 PSB. Only sub-basins containing at least 20 percent BLM managed land were included in the initial prioritization. The criteria are further described in relation to the data themes, data sources and data limitations in Attachment 1. A WO Team, with support from the National Science and Technology Center, developed a website (http://ncsd3arc1.corp.blm.gov/website/psip) displays the initial work on PSB.

Time Frame: This IM is effective upon receipt. Key dates are:

- **07/03/03** – State leads submitted to Washington Office (220)

$ **12/31/03** - State comments due to Washington Office (200)
$ **03/31/04** - Washington Office approval of PSB
$ **03/31/04** - States complete Delineation of Watersheds/Subwatersheds
$ **03/31/05** - States complete Prioritization of Watersheds/Subwatersheds

Policy/Action: This IM requires States to review the national mapping effort and the initial selection of PSB collaboratively with partners such as State and federal agencies, county organizations, local watershed groups and other stakeholders. It is critical that States provide consolidated feedback on the adequacy of the selection results along with detailed rationale for any proposed changes, by **December 31, 2003.** The State feedback should focus on the validation of resource conditions (status), risks, opportunities, and concerns. Not all States conducted the same level of inventory for themes such as the Abandoned Mine Lands or acres of BLM infested with weeds. Therefore, if your State has better data that may elevate the importance value of a theme or confirm or modify a PSB, you are encouraged to identify that in your response. Since the goal is to identify 150 PSB across the Bureau, each State that identifies additional PSB will also need to identify an equal number of the initial PSB to be removed from the list in order to maintain the total number of PSB.

After careful review and consideration of all State feedback by WO staff and final acceptance of PSB by the WO, scheduled for **March 31, 2004**, State and field offices should develop criteria collaboratively to identify, at a minimum, watersheds (5th Field Hydrologic Units) and, if desired locally, sub-watersheds (6th Field Hydrologic Units) which warrant either conservation or restoration priority within the PSB. It is expected that State and field offices will work with partners such as, State and federal agencies, Tribes, county organizations, resource advisory councils, local watershed groups and other stakeholders to help identify priority watersheds. It should be noted that the States are encouraged to prioritize watersheds and/or sub-watersheds even in areas outside of PSB.

The criteria utilized in the identification of priority watersheds should address the need to conserve or restore ecosystem functionality and consider: 1) partnership opportunities, including funding support, 2) activities or designations that may affect management within the watersheds such as potential oil and gas development, or special designations such as Areas of Critical Environmental Concern, Natural Research Areas, National Monuments, and National Conservation Areas, 3) physical watershed conditions including upland, riparian-wetland and aquatic components, 4) ecological processes such as, the hydrologic cycle, the nutrient cycle, and energy flow including fire regimes, 5) habitat quality and diversity for common, sensitive and special status animals and native plants and 6) water quality. Any watersheds/subwatersheds identified should be able to show a positive, sustainable response to management actions with a reasonable investment and should include at least 20 percent of BLM managed land.

Current work at the State and regional level to develop criteria for identifying priority watersheds for conservation and restoration actions and grazing allotment prioritization for assessment of Standards and Guidelines should be used whenever possible. For example, the BLM Great Basin Restoration Initiative (GBRI) has already developed detailed criteria that identify conservation and restoration priorities at the watershed level. Attachment 2 shows an example of a watershed prioritization process that evaluates the status, risks and opportunities for both restoration and conservation based on criteria developed at the local level. Please note this example is provided as only a guide to consider when working with your partners and cooperators to develop criteria and a process to identify priorities.

Identification of priority watersheds within PSB should be completed by **March 31, 2005.** We recognize that many sub-basins and data themes cross State boundaries and administrative unit boundaries. In all cases of shared jurisdiction of sub-basins, we expect the States and field offices to work together and coordinate recommendations submitted to the WO. Each State office lead will coordinate with and consolidate feedback from their field offices and submit a memorandum by the above date to Assistant Director Renewable Resources and Planning (WO200); 1) a priority ranking of watersheds/subwatersheds identified by 10 or 12 digit HUC number, and 2) a brief description of the methodology used for ranking.

To aid in this effort all States should complete delineations of the 5th Field HUCs, (and if appropriate, 6th Field HUCs), by **March 31, 2004,** using the current proposed Federal Standards (Federal Standards for Delineation of Hydrologic Unit Boundaries, March 1, 2002, Federal Geographic Data Committee), available at www.ftw.nrcs.usda.gov/huc_data.html. Where BLM is working with other agencies to delineate HUC boundaries, (e.g., scattered public lands), please request completion of the watershed delineation work within the PSB prior to working in non-PSB.

Budget Impact: The approved PSB will be used as an additional tool in the WO budget development process. Beginning in FY 2004, any increased funding for Resource Protection (conservation and restoration) may be allocated based upon needs and opportunities identified within PSB. Potential sources of existing flexible funding which may be allocated to PSB are the Clean Water Funds, Rangeland Management funds, National Fire Plan funds or Forest Management funds.

Manual/Handbook Sections Affected: This IM supplements the 4180 Rangeland Health Standards and Guidelines Handbook for Conducting Watershed-based Land Health Assessments issued by WO IM-2001-079, January 25, 2001.

Coordination: This IM was coordinated with WO 170, 210, 230, 260, 300, 360, 400 (NLCS), 880, and the Office of Fire and Aviation.

Contact: If you have any questions regarding this information or response protocols, please contact Steve Borchard at (202) 452-0357, or Tim Reuwsaat, Group Manager, Rangeland, Soil, Water, and Air at (202)-452-5179.

2 Attachments
  1 - Data Themes for Priority Sub-Basin Mapping (4 pp)
  2 - Watershed Prioritization Process Example (8 pp)

ATTACHMENT 1- DATA THEMES FOR PRIORITY SUB-BASIN MAPPING

1. Fire Condition Class

This theme shows sub-basins where vegetation attributes (e.g., species composition, structural stage, age, and canopy closure) are thought to have been moderately or significantly altered from their historical range and the risk of losing key ecosystem components from occurrence of a wildfire is thought to be moderate or high (based on raster data with 1 km resolution). The data may be viewed from a USFS website, http://www.fs.fed.us/fire/fuelman

2. Mortality (Tree)

Forest Insect and Disease Mortality Risk - This data theme (data derived from USFS 1 km resolution raster data) shows sub-basins that are predicted to have higher than average tree mortality from any of 26 insects and diseases over the next 15 years. The USFS data can be viewed at http://www.fs.fed.us/foresthealth/risk_maps/riskmort.pdf

3. Weed Inventory

A Weed theme was based on data that were submitted by the states in response to IM 2001-034 (Weed Inventory/Mapping Update). These data include actual acres of weed infestation inventoried and estimated in each BLM District/Field Office. The data were then overlaid with level 4 HUC's, and from that data, the percentage of the BLM lands infested was proportioned, to generate a secondary statistic, percent of BLM lands by District/Field Office.

4. Special Status Species Restoration Areas

Nevada and Oregon/Washington identified PSB for special status species habitat restoration in response to the IM 2001-060. The scope of the project was then expanded to all of the western states. With the remaining states, the State Office biologists were asked to provide the WO with sub-basins that have special status species habitat that are in need of restoration.

5. Wild Horse and Burros

Origin of Data: Units of data included in the WH&B themes are derived as follows: A Herd Management Area (HMA) is a geographic area designated through the land use planning process where animals will be managed. There are 204 HMA's that have been designated throughout 10 Western States. These include Nevada, California, Wyoming, Colorado, Oregon, Utah, Arizona, Idaho, Montana and New Mexico. Appropriate Management Levels (AML) of animals are to be established for each HMA. An AML is the level at which an HMA can sustain a given animal herd at optimum health without further degradation of either the resource or other animal populations which share that resource. The maps show the total number of HMA's for wild horses and burros where existing populations exceed AML.

6. Abandoned Mine Land Site Density/Public Health

The Abandoned Mine Lands Inventory System (AMLIS) database currently contains information on more than 9,000 sites, and the majority of data reflect inventories of 1993-95. This initial inventory serves as a baseline from which to evaluate potential areas of concern that include, sensitive watersheds, high visitor-use, or recreation areas where abandoned mines pose environmental and public safety threats. Original inventory efforts of mine sites were conducted at varying level of purpose, completeness, quality, and accuracy. The AMLIS database currently is populated with location, site-specific definition, and environmental data. Location data has been defined for approximately 80 percent of the sites contained within AMLIS. The analysis employed in this IM used the AMLIS data. Density plots of the total number of sites within a sub-basin based on database queries have been incorporated into the analysis. It is recognized that most of the AMLIS data has not been specifically verified and may pose little or no environmental risk.

A concerted effort to include information on the cost and project tracking associated with physical and environmental hazard remediation has been made. Through this effort, a subset of locations have been identified as sites where work has been completed, are in-progress or are candidates for future work in accordance with established BLM Management Information System (MIS) guidelines (i.e., program element designations). The majority of these sites have been targeted for watersheds where individual States have the lead responsibility for identifying impaired watersheds through the Unified Watershed Assessment process. The BLM, USFS, EPA, and other State and Federal Agencies collaborate in the decision to proceed with work within those watersheds identified as adversely impacted by past mining activities.

7. Riparian Habitats Greater than 50 percent at Risk

The riparian data analyses were prepared using current functioning condition data submitted to the WO by each state as of September 30, 2000, using the Proper Functioning Condition classification. The data were submitted for each Field Office or District administrative unit.

The data were screened for analysis based on several criteria and steps: The percentage of the administrative unit's lotic wetlands (flowing water) in the categories of Functional at Risk, Trend Not Apparent, and Functional at Risk, Trend Down were combined. If this combination resulted in more than 50 percent or more of the administrative unit's lotic system mileage, then the sub-basins with 20 percent or more land base in BLM ownership were identified as high priority for restoration.

8. Unified Watershed Assessments

The Clean Water Action Plan (1998) requested States and tribes to work with Federal land managers and the public to assess the condition of watersheds. To this end, Unified Watershed Assessments (UWAs) were published in late 1998 under the oversight of the Environmental Protection Agency (EPA) and the U.S. Department of Agriculture. The USGS Level 4 HUC served as the common scale for UWAs.

There are four Categories within the UWA Framework, as follows:

CATEGORY I - Denotes watersheds that do not now meet, or face an imminent threat of not meeting, clean water (i.e., water quality standards), and other natural resource goals (e.g., properly functioning riparian and wetland habitat).

CATEGORY II - Denotes watersheds meeting goals currently and needing additional actions to sustain water quality and other natural resource goals.

CATEGORY III - Denotes watersheds with pristine water quality or sensitive aquatic species conditions on lands that are administered by Federal, State, or tribal governments.

CATEGORY IV- Denotes watersheds with insufficient data to make a determination of whether they are in Category I, II, or III.

For PSB identification Category I was employed as the primary threshold, although Category III was also evaluated but it did not change the number of PSB, nor did it change the ranking or location of any PSB.

9. Water Quality Index of Watershed Indicators (IWI)

This EPA Index rates the condition and vulnerability of aquatic systems across the United States. It incorporates 16 data layers. Some of these layers are: State/Tribal Sec. 503(b) reports under the Clean Water Act (meeting designated uses), presence of various toxics and pollutants, wetland loss, urban and agricultural runoff potential. Overall scores are portrayed by sub-basin, some of which have insufficient data. For PSB the two IWI watershed classifications used were the most serious, and less serious water quality problems.

In addition to the above data themes, the evaluation of priority sub basins has employed boundary information for states, as well as BLM administrative unit (Field Office and District) boundaries. Hydrologic Units have also been used as an organizing template, and they represent the land area enclosed within Hydrologic Unit Boundaries, as compiled by the U.S. Geological Survey (USGS Water Supply Paper 2294). The Hydrologic Units represent natural and manmade stream drainage areas. The data source is the National Atlas. The hydrologic units are intended for display and analysis at the national level, and are contained in the Hydrologic Unit Hierarchy, a hierarchical series of levels of hydrologic units of different sizes nested within each other in a mutually exclusive and additive manner. The HUC code is a standard for identifying hydrologic units and each successive level in the Hydrologic Unit Hierarchy differs by two digits. Subbasins are HUC4 and represent the 4th level in the Hydrologic Unit Hierarchy and are 8 digits long. Subbasins are a useful scale to establish broad priorities, however, specific actions need to be identified within priority watersheds (HUC5, 10-digit) and within subwatersheds (HUC6, 12-digit) at a finer scale. Hydrologic Units are critical frameworks for organizing hydrologic data, including data on water body impairments; for example, Total Maximum Daily Load plans are being developed by states at the sub-watershed and watershed levels.

ATTACHMENT 2 - Example of a Watershed Prioritization Process

This prioritization process was developed as part of the Great Basin Restoration Initiative. It is presented as an example of how to work through and clearly document the watershed prioritization process. Instructions and an example of a completed worksheet is shown below:

State:XX District: XXXX
Watershed Name: Watershed A
Watershed HUC5 (10 digit) Identification Number: 0123456789
Evaluator(s): Great Basin Restoration Initiative Team Date: 11/3/00

	Rank of 5 = High; 4 = Moderate-High; 3 = Moderate; 2 = Low-Moderate; 1 = Low; 0 = Not Applicable			
Criteria	Status	Risk	Opportunity	Rationale/Comments
*1. Wildland-Urban Interface (Public Health and Safety Concerns)	3	2	4	Few secondary roads in the watershed that are traveled by the public. Wildland-Urban Interface restricted to the southeastern 5% of the watershed, but lies within the 30% of the watershed that is dominated by cheatgrass.
*2. Similarity of Existing Wildland Fire Regime to Natural Range of Variability of Wildland Fire Regime	2	4	3	Wildland fire return interval is less than 10 years on 30% of the watershed because of cheatgrass.
*3. Special Status Species (SSS) and Species/Habitats of Concern (SHOCs)	4	4	4	Sage grouse is a species of concern in this watershed. Roughly 70% of the watershed is sage grouse habitat, and roughly 70% of the sage grouse habitat is key-habitat, with the remaining 30% being restoration type habitat (ideas adopted from Sather-Blair et al. 2000, Idaho Habitat Framework). Key- habitat has a
*4. Integrity of Current Plant Communities or Plant Associations, Relative to Invasive Species Abundance	3	4	2	Cheatgrass is a dominant species on about 30% of the watershed. There is a relatively high risk of rush skeletonweed invading cheatgrass-dominated areas within the next 3 years and decreasing the status even further.
**5. Riparian Area Function and Condition (includes Water Quality)	4	1	4	PFC assessments show few problems on the 15 miles of riparian area in the watershed. Only minor problems (easily fixable) identified on the 6 miles of Section 303d streams in the watershed.
***6. Soil Properties (E.g. erodibility by water; erodibility by wind; salinity; sodicity)	▨	2	4	Small portions (between 10 and 20%) of the watershed contain soils with a high combined potential for wind and water erosion.
*7. External Partnerships/Collaboration	3	▨	4	Knowledge of the impending noxious weed advance into the watershed is galvanizing county government, The Nature Conservancy, the Paiute Tribe, and Local Boy Scout Troops 343 and 582 into committing to long-term weed control.
*8. Cultural and Historical Resources and Cultural Landscapes	5	▨	4	Paiute Tribe regards the watershed highly for subsistence hunting and cultural plant uses.
Sum of Rankings	24	17	29	
Overall Rating (High, Moderate, or Low)	High	Moderate	High	
Final Evaluation:	**Functioning**			

Worksheet Instructions

Step 1: Assign a ranking to each of the criterion with respect to status, risk and opportunity.

The eight criteria in this example were developed at the local level and then evaluated and ranked with respect to status, risk and opportunity.

Definitions for Status, Risk, and Opportunity

Status: The condition of a criterion (biological or socioeconomic resource values or conditions) within the watershed. A ranking is assigned to each criterion to describe status. The ranking will be relative, either to the natural range of variability for that criterion (for example, a wildland fire regime criterion) or relative to a time period when the criterion did not exist (for example, an external partnerships/collaboration criterion).

Current Risk: The likelihood that an event would lead to circumstances that adversely affect the status of a criterion (biological or socioeconomic resource values or conditions) within the watershed. A ranking is assigned to each criterion to describe current risk. The risks estimated are those associated with inherent ecosystem disturbance processes (such as drought, wildfire, disease, insects), ongoing land uses (such as livestock grazing, mining, OHV recreation), or activities (such as road maintenance).

Potential Restoration Opportunity: The potential of the watershed to respond favorably (an increase in status and decline in current risk) to actions designed to achieve objectives for restoring ecosystem health and, at the same time, contributing to the provision of goods and services. A ranking is assigned to each criterion (biological or socioeconomic resource values or conditions) to described opportunity. Opportunity can include the relative willingness of stakeholders and adjacent landowners to participate.

Step 2: Sum the rankings for status, risk and opportunity and convert the numeric ranking to a qualitative rating of High, Moderate or Low using Table 1.

Table 1: Ranking Conversion Table

Total Ranking	Low	Moderate	High
Status	0-11	12-23	24-35
Risk	0-10	11-20	21-30
Opportunity	0-13	14-26	27-40

Step 3: Determine if the watershed is: 1) Functioning, 2) Functioning at Risk, 3) Improperly Functioning with Potential for Recovery under Reasonable Costs, or 4) Improperly Functioning with Uneconomical Recovery Costs by consulting column 4 of Table 2.

Step 4: Identify the watershed as either a candidate for conservation, restoration, or a candidate for neither conservation nor restoration by consulting column 5 of Table 2.

See Column 6 in Table 2 for the rationale for the manner in which Final Evaluations were classified, and the rationale for why the watersheds were identified for Conservation, Restoration or neither.

Step 5: Determine the order of priority for the watersheds that are candidates for conservation based on the total risk ranking. See Table 3 for an example.

Table 3: Examples of Priority Watersheds for Conservation

Functioning at Risk	Risk Sum of Ranking	Order of Priority
Watershed D	40	1
Watershed B	36	2
Watershed G	33	3
Watershed F	29	4
Functioning	Risk Sum of Ranking	Order of Priority
Watershed C	26	1
Watershed A (case examples)	17	2
Watershed E	12	3
Watershed H	7	4

Based on the prioritization of conservation of these 8 fictitious watersheds, Watershed D is the highest priority for conservation, and Watershed H is the lowest priority for conservation.

Step 6: Determine the order of priority for the watersheds that are candidates for restoration based on the total opportunity ranking. See Table 4 for an example.

Table 4: Examples of Priority Watersheds for Restoration

Improperly Functioning with Potential for Recovery under Reasonable Costs	Opportunity Sum of Ranking	Order of Priority
Watershed K	31	1
Watershed L	24	2
Watershed J	19	3
Watershed M	17	4

Based on the prioritization of these 4 fictitious watersheds, Watershed K is the highest priority for restoration, and Watershed M is the lowest priority for restoration.

Again, this is an example of how to logically prioritize watersheds for conservation or restoration while at the same time clearly document the prioritization process for future reference. If watersheds have already been prioritized or other prioritization processes been developed, there is no requirement to work through this example. However, the State and/or office should be able to clearly document the process used to determine the priority watershed.

Table 2: Look Up Table for Status, Risk, and Opportunity Ratings, Final Evaluations, Candidacy for Conservation or Restoration and Priority Rationale.

Status	Risk	Oppor-tunity	Final Evaluation	Candidate for Conservation, Restoration, or neither?	Rationale
High	High	High	Functioning at Risk	Conservation	The High Status infers "Functioning," whereas the High Risk infers "At Risk". The High Risk connotes an urgency to conserve resource conditions and take action against possible adverse-effect disturbances, land uses, or activities, which are highly likely to be operating within the watershed or near its borders in the near future. The management focus for the watershed is conservation, but because of the threats, restoration actions (for example, weed control) might be necessary at times to achieve long-term conservation.
High	High	Moderate	Functioning at Risk	Conservation	See rationale for High-High-High
High	High	Low	Functioning at Risk	Conservation	See rationale for High-High-High
High	Moderate	High	Functioning	Conservation	The High Status infers "Functioning". The Moderate Risk connotes a moderate probability that disturbances, land uses, or activities would adversely affect the status of resource conditions within the watershed or near its borders in the near future. The management focus for the watershed is conservation. Because the risk is less in Functioning watersheds compared with Functioning at Risk watersheds, there is a greater likelihood that a more passive approach to management would be likely to sustain current resource conditions and be adequate to conserve resource conditions.
High	Moderate	Moderate	Functioning	Conservation	See rationale for High-Moderate-High
High	Moderate	Low	Functioning	Conservation	See rationale for High-Moderate-High

High	Low	High	Functioning	Conservation	The High Status infers “Functioning”. The low risk connotes a low probability that disturbances, land uses, or activities would adversely affect the status of resource conditions within the watershed or near its borders in the near future. The management focus for the watershed is conservation. Because the risk is less in Functioning watersheds compared with Functioning at Risk watersheds, there is a greater likelihood that a more passive approach to management would be likely to sustain current resource conditions and be adequate to conserve resource conditions.
High	Low	Moderate	Functioning	Conservation	See rationale for High-Low-High
High	Low	Low	Functioning	Conservation	See rationale for High-Low-High
Moderate	High	High	Improperly Functioning with Potential for Recovery under Reasonable Costs	Restoration	The Moderate Status infers Improperly Functioning. The management focus for the watershed is Restoration. The High Opportunity infers Potential for Recovery under Reasonable Costs.
Moderate	High	Moderate	Improperly Functioning with Potential for Recovery under Reasonable Costs	Restoration	The Moderate Status infers Improperly Functioning. The management focus for the watershed is Restoration. The Moderate Opportunity infers Potential for Recovery under Reasonable Costs.
Moderate	High	Low	Improperly Functioning with Uneconomical Recovery Costs	Neither	The Moderate Status infers Improperly Functioning. The Low Opportunity infers Uneconomical Recovery Costs and also removes this watershed from being prioritized for restoration.
Moderate	Moderate	High	Improperly Functioning with Potential for Recovery under Reasonable Costs	Restoration	See rationale for Moderate-High-High.

Moderate	Moderate	Moderate	Improperly Functioning with Potential for Recovery under Reasonable Costs	Restoration	See rationale for Moderate-High-Moderate.
Moderate	Moderate	Low	Improperly Functioning with Uneconomical Recovery Costs	Neither	See rationale for Moderate-High-Low.
Moderate	Low	High	Improperly Functioning with Potential for Recovery under Reasonable Costs	Restoration	See rationale for Moderate-High-High.
Moderate	Low	Moderate	Improperly Functioning with Potential for Recovery under Reasonable Costs	Restoration	See rationale for Moderate-High-Moderate.
Moderate	Low	Low	Improperly Functioning with Uneconomical Recovery Costs	Neither	See rationale for Moderate-High-Low.
Low	High	High	Improperly Functioning with Potential for Recovery under Reasonable Costs	Restoration	The Low Status infers Improperly Functioning. The management focus for the watershed is Restoration. The High Opportunity infers Potential for Recovery under Reasonable Costs.
Low	High	Moderate	Improperly Functioning with Potential for Recovery under Reasonable Costs	Restoration	The Low Status infers Improperly Functioning. The management focus for the watershed is Restoration. The Moderate Opportunity infers Potential for Recovery under Reasonable Costs.

Low	High	Low	Improperly Functioning with Uneconomical Recovery Costs	Neither	The Low Status infers Improperly Functioning. The Low Opportunity infers Uneconomical Recovery Costs and also removes this watershed from being prioritized for restoration.
Low	Moderate	High	Improperly Functioning with Potential for Recovery under Reasonable Costs	Restoration	See rationale for Low-High-High.
Low	Moderate	Moderate	Improperly Functioning with Potential for Recovery under Reasonable Costs	Restoration	See rationale for Low-High-Moderate.
Low	Moderate	Low	Improperly Functioning with Uneconomical Recovery Costs	Neither	See rationale for Low-High-Low.
Low	Low	High	Improperly Functioning with Potential for Recovery under Reasonable Costs	Restoration	See rationale for Low-High-High.
Low	Low	Moderate	Improperly Functioning with Potential for Recovery under Reasonable Costs	Restoration	See rationale for Low-High-Moderate.
Low	Low	Low	Improperly Functioning with Uneconomical Recovery Costs	Neither	See rationale for Low-High-Low.

1.1.03

Mission Area	1. Resource Protection
End Outcome Goal	1.1 Improve Health of Watersheds, Landscapes, and Marine Resources that are DOI Managed or Influenced in a Manner Consistent with Obligations Regarding the Allocation and Use of Water.
Measure Number/Title	1.1.03: Upland Areas &ndash; Percent of acres achieving desired conditions where specified in management plans and condition is known, consistent with applicable substantive and procedural requirements of State and Federal water law.
Data Reported	D1: Number of acres of uplands achieving desired condition. D2: Number of acres of uplands where desired condition is specified in management plans and condition is known.
Scope of the Measure	The scope of this measure is dictated by the applicable management plans. It specifically includes upland watershed acres that are addressed in management plans and that have desired conditions specified in management plans (including management plans on Federal lands outside DOI, plans developed by private entities, or state and local government agencies). This may include management plans developed through partnership with private entities, or state and local governments.
Point of Contact	WO-220: Richard Mayberry (202-452-7750)
Key Terms/ Definitions	• **Uplands:** Areas that are not inundated or saturated by surface or ground water and support vegetation dependent on aerobic soil conditions. • **Desired condition:** The qualitative or quantitative natural resource attributes of the wetland area that are identified through the planning process as the desired outcome of management. The description of desired condition includes measurable objectives for the identified attributes, including physical, chemical, hydrologic, and biologic attributes. The desired condition for a particular area may or may not be the attributes that represent natural conditions or indicate that natural processes predominate in the area. • **Management plan:** A land use plan as defined by a Bureau&rsquo;s law, regulation, or policy. For example, BLM&rsquo;s Federal Land Policy and Management Act, FWS&rsquo;s National Wildlife Refuge Improvement Act of 1997. The plan generally designates in a written document land areas and resource uses, condition goals and objectives, program constraints, and management practices. The plan may identify the need for additional detailed step-down plans, support action, implementation sequences, and monitoring standards. Under this measure, the term management plan includes plans developed through partnerships (e.g., plans developed in partnership with other federal, state, and local government entities, and private entities).
Measurement Process	Percent equals 100 times the quotient of the number of acres of uplands achieving desired conditions divided by the number of acres of uplands with desired conditions specified in management plans and condition is known. [100 x (D1 / D2)] [100 x (135,000,000 acres / 214,000,000 acres)] = 64 %.
Reporting Frequency	Annual.

Reporting Responsibility	National: The WO-220 Group (in coordination with state/field offices) will establish annual targets and report annual accomplishments in the Management Information System for this performance measure. Data for data points, D1 and D2 will be obtained from state/field offices through a data call.
Baseline	The FY 2004 baseline: there are 214,000,000 acres of uplands where desired condition is specified in management plans and condition is known.
Date of Last Change	April 10, 2004
Comments	BLM will report upland areas attaining Land Health Standards and achievement of land use plan objectives as achieving desired condition. This measure coincides with DOI Strategic Plan performance measure: PEM.1.003.

1.1.04

Mission Area	1. Resource Protection
End Outcome Goal	1.1 Improve Health of Watersheds, Landscapes, and Marine Resources that are DOI Managed or Influenced in a Manner Consistent with Obligations Regarding the Allocation and Use of Water.
Measure Number/Title	1.1.04: Percent of surface waters (acres) managed by DOI that meet EPA-approved (State) water quality standards.
Data Reported	D1: Surface acres of lakes, reservoirs, estuaries, and seas managed by DOI that meet EPA-approved water quality standards. D2: Surface acres of lakes, reservoirs, estuaries and seas managed by DOI.
Scope of the Measure	Surface waters of the United States managed by DOI that have applicable water quality standards (Clean Water Act).
Point of Contact	WO-220: Steve Borchard (202-452-0357) (Jim Renthal will be contact when he is onboard)
Key Terms/ Definitions	• **Waters of the United States** : As defined at 40 CFR 122.2, means all waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; all wetlands, intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, sloughs, prairie potholes, wet meadows, playa lakes, and natural ponds; all waters which are or could be used by interstate or foreign travelers for recreation and other purposes;waters from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; waters which could be used for industrial purposes; territorial seas and all tributaries to the above. • **Surface waters managed by DOI** : Means all waters of the United States that flow through or is on or within an area that is under DOI&rsquo;s direct jurisdiction and management control. • **EPA-approved water quality standards** : Are provisions of State, Federal or Tribal law which consists of designated uses or uses for the waters of the United States , numerical and narrative water quality criteria that are protective of the uses, and an anti-degradation policy.
Measurement Process	• Water quality standards are not met when any of the below conditions occur: 1. DOI managed waters are listed on a State Clean Water Act Section 303d list as having water quality standard violations. 2. The DOI bureau has written documentation prepared by water quality specialist(s) or scientist(s) that identifies the specific water body where standards are not being attained, and quantifies the area in acres of surface water. The determination that standards are not being attained should be based on scientific water chemistry, aquatic life, or habitat assessments. 3. Other specific bureau statutory requirements related to the Clean Water Act are not being attained. • Percent equals 100 times the quotient of the surface acres of lakes,

	reservoirs, estuaries and seas managed by DOI that meet EPA-approved water quality standards divided by acres of surface waters managed by DOI.
Reporting Frequency	Annual. Data relating to this performance measure will be reported to the DOI on a cumulative basis (i.e., annual accomplishments build upon the accomplishments from previous years).
Reporting Responsibility	National: The WO-220 Group (in coordination with state/field offices) will establish annual targets and report annual accomplishments in the Management Information System for this performance measure. Data for data points D1 and D2 will be obtained from the state/field offices via a data call.
Baseline	FY04: Baseline for this performance measure will be established in FY 2004.
Date of Last Change	April 12, 2004
Comments	This measure coincides with DOI Strategic Plan performance measure PEM.1.008.

1.1.05

Mission Area	1. Resource Protection
End Outcome Goal	1.1 Improve Health of Watersheds, Landscapes, and Marine Resources that are DOI Managed or Influenced in a Manner Consistent with Obligations Regarding the Allocation and Use of Water.
Measure Number/Title	1.1.05: Percent of stream miles managed by DOI that meet EPA-approved (State) water quality standards.
Data Reported	D1: Miles of streams and waters managed by DOI that meet EPA-approved water quality standards. D2: Miles of streams and rivers managed by DOI.
Scope of the Measure	Surface waters of the United States managed by DOI that have applicable water quality standards (Clean Water Act).
Point of Contact	WO-220: Steve Borchard (202-452-0357) (Jim Renthal will be contact when he is onboard)
Key Terms/ Definitions	• **Waters of the United States** : As defined at 40 CFR 122.2, means all waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; all wetlands, intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, sloughs, prairie potholes, wet meadows, playa lakes, and natural ponds; all waters which are or could be used by interstate or foreign travelers for recreation and other purposes;waters from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; waters which could be used for industrial purposes; territorial seas and all tributaries to the above. • **Surface waters managed by DOI** : Means all waters of the United States that flow through or is on or within an area that is under DOI&rsquo;s direct jurisdiction and management control. • **EPA-approved water quality standards** : Are provisions of State, Federal or Tribal law which consists of designated uses or uses for the waters of the United States , numerical and narrative water quality criteria that are protective of the uses, and an anti-degradation policy.
Measurement Process	• Stream or river mile is measured along the centerline of the stream channel, including all perennial, intermittent and ephemeral channels. • Water quality standards are not met when any of the below conditions occur: 1. DOI managed waters are listed on a State Clean Water Act Section 303d list as having water quality standard violations. 2. The DOI bureau has written documentation prepared by water quality specialist(s) or scientist(s) that identifies the specific water body where standards are not being attained, and quantifies the area in miles or acres of surface water. The determination that standards are not being attained should be based on scientific water chemistry, aquatic life, or habitat assessments and 3. Other specific bureau statutory requirements related to the Clean Water Act are not being attained.

	- Percent equals 100 times the quotient of the miles of streams and rivers managed by the BLM that meet EPA-approved water quality standards divided by miles of steams and rivers managed by DOI. [100 x (120,316 miles / 136,791 miles)] = 88%.
Reporting Frequency	Annual. The percent of stream miles managed by the BLM that meet EPA-approved (State) water quality standards will be reported to the DOI on a cumulative basis (i.e., annual accomplishments build upon the accomplishments from previous years).
Reporting Responsibility	National: The WO-220 Group (in coordination with state/field offices) will establish annual targets and report annual accomplishments in the Management Information System for this performance measure. Data for data points D1 and D2 will be obtained from the state/field offices via a data call.
Baseline	The FY 2004 basline: there are 136,791 miles of streams managed by the BLM.
Date of Last Change	May 6, 2004
Comments	This measure coincides with DOI Strategic Plan performance measure PEM.1.008.

1.1.06

Mission Area	1. Resource Protection
End Outcome Goal	1.1 Improve Health of Watersheds, Landscapes, and Marine Resources that are DOI Managed or Influenced in a Manner Consistent with Obligations Regarding the Allocation and Use of Water.
Measure Number/Title	1.1.06: Percent of reporting Class I DOI lands that meet National Ambient Air Quality Standards (NAAQS).
Data reported	D1: Number of reporting Class I DOI lands with air quality monitoring data meeting National Ambient Air Quality Standards. D2: Number of reporting Class I DOI lands with air quality monitoring data.
Scope of the measure	Ambient air quality monitoring of NAAQS pollutants in Class I DOI lands.
Point of contact	WO-220: Scott Archer (303-236-6400)
Key Terms / definitions	• **Reporting:** DOI Class I lands with on-site ambient air quality monitoring stations or DOI Class I lands without on-site monitors but having estimates of their air quality based on spatial analysis of existing national air quality data sets. • **National Ambient Air Quality Standards (NAAQS):** The more stringent of the state or national standards should apply to a given area. For the purposes of this document, exceeding any one of these standards constitutes a violation. The NAAQS are as follows: • Sulfur dioxide (SO 2): annual average &ndash; 80 micrograms/cubic meter, 24-hour &ndash; 365 micrograms/cubic meter • Nitrogen dioxide (NO 2): annual average &ndash; 100 micrograms/cubic meter • Carbon monoxide (CO): 8-hour &ndash; 10,000 micrograms/cubic meter, 1-hour &ndash; 40,000 micrograms/cubic meter • Lead (Pb): quarterly average &ndash; 1.5 micrograms/cubic meter • Ozone (O 3): 8-hour &ndash; 0.08 parts per million • Particulate Matter (PM-10): annual arithmetic mean &ndash; 50 micrograms/cubic meter, 24-hour &ndash; 150 micrograms/cubic meter • Particulate Matter (PM-2.5): annual arithmetic mean &ndash; 15 micrograms/cubic meter, 24-hour &ndash; 65 micrograms/cubic meter. • **Meet ambient air quality (NAAQS) standards:** Occurs when the ambient air quality levels of pollutants in an area do not exceed the levels of the state or National Ambient Air Quality Standards. • **Reporting:** Class I DOI lands with on-site visibility monitoring stations or DOI Class I lands without on-site monitors but having estimates of their visibility based on spatial analysis of existing national air quality data sets. • **Class I DOI lands:** The 1990, CAA Amendments designated the following as mandatory Class I areas: international parks, national wilderness areas greater than 5,000 acres in size, national memorial parks greater than 5,000 acres in size, national parks greater than 6,000 acres that were in existence as of 1977. There are 48 units of the National Park System, 21 units of the National Wildlife Refuge System, 1 international park, and 4 units that BLM are designated BLM Wilderness Areas that

	are DOI lands designated as Class I areas.
Measurement process	Percent equals 100 times the quotient of the number of DOI Class I lands meeting the NAAQS standards divided by the number of reporting DOI Class I lands. [100 x (2 / 4)] = 50%.
Reporting frequency	Annual. Data relating to this performance measure will be reported to the DOI on a cumulative basis (i.e., annual accomplishments build upon the accomplishments from previous years).
Reporting Responsibility	National: The WO-220 Group will establish annual targets and report annual accomplishments in the Management Information System for this performance measure.
Baseline	The FY 2004 baseline: the BLM manages 4 areas designated as Class I lands.
Date of Last Change	May 6, 2004
Comments	This measure coincides with DOI Strategic Plan performance measure: PEM.1.010.

1.1.07

Mission Area	1. Resource Protection
End Outcome Goal	1.1 Improve Health of Watersheds, Landscapes, and Marine Resources that are DOI Managed or Influenced in a Manner Consistent with Obligations Regarding the Allocation and Use of Water.
Measure Number/Title	1.1.07: Percent of reporting Class I DOI lands that meet visibility objectives.
Data reported	D1: Number of reporting Class I DOI lands with visibility monitoring data meeting visibility objectives. D2: Number of reporting Class I DOI lands with visibility monitoring data.
Scope of the measure	Visibility monitoring on Class I DOI lands.
Point of contact	WO-220: Scott Archer (303-236-6400)
Key Terms / definitions	• **Reporting:** Class I DOI lands with on-site visibility monitoring stations or DOI Class I lands without on-site monitors but having estimates of their visibility based on spatial analysis of existing national air quality data sets. • **Visibility objectives:** &ldquo;Congress hereby declares as a national goal the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution (Clean Air Act Amendments 1990, section 169A).&rdquo; In 1999, EPA promulgated visibility protection regulations that require a return to natural visibility conditions over a 60-year period at those mandatory Class I Federal areas where visibility was identified by the Secretary as an important value. Specific rates of improvement will differ for each Class I area; EPA to publish those soon. • **Meet visibility objectives:** Occurs when &ldquo;reasonable progress&rdquo; is made toward achieving EPA&rsquo;s goal of restoring natural visibility over a 60-year period. Incremental progress toward that goal is regarded as reasonable progress, but it will differ for each class I federal area (EPA to publish soon). In the absence of published visibility objectives, surrogate objectives may be used such as &ldquo;visibility in reporting Class I DOI lands has remained stable or improved.&rdquo; • **Class I DOI lands:** The 1977 CAA Amendments designated the following as mandatory Class I areas: international parks, national wilderness areas greater than 5,000 acres in size, national memorial parks greater than 5,000 acres in size, national parks greater than 6,000 acres that were in existence as of August 7, 1977. There are 48 units of the National Park System, 21 units of the National Wildlife Refuge System, 1 international park, and 4 units that BLM shares administration with the USDA Forest Service, that are DOI lands designated as Class I areas.
Measurement process	100 times the number of reporting DOI Class I lands meeting the visibility objectives divided by the number of reporting DOI Class I lands. [100 x (D1/D2)] [100 x (0 / 4)] = 0%.

Reporting frequency	Annual. Data relating to this performance measure will be reported to the DOI on a cumulative basis (i.e., annual accomplishments build upon the accomplishments from previous years).
Reporting Responsibility	National: Targets and accomplishments relating to this performance measure will be entered in the Management Information System by the WO-220 Group. The WO-220 Group will establish the annual targets for this performance measure.
Baseline	The FY 2004 baseline: the BLM manages 4 designated Class 1 lands with visibility monitoring data.
Date of Last Change	May 6, 2004
Comments	For visibility, the monitoring protocol is different than those used for continuous 24/7 monitoring of gases such as ozone or sulfur dioxide. EPA guidance suggests using particulate matter data to track progress in the regional haze regulations. Typically a 24-hour integrated particulate matter sample (one sample taken over a 24-hour period) is taken every 3 days and then analyzed for the presence of chemical constituents that cause visibility impairment. These 24-hour samples can then be averaged and monitoring results can be reported annually. (There are visibility monitoring instruments available that monitor optical conditions continuously; however the particulate matter samplers are the basis for enforcement of EPA&rsquo;s Regional Haze Regulation). This measure coincides with DOI Strategic Plan performance measure: PEM.1.011.

1.1.08

Mission Area	1. Resource Protection
End Outcome Goal	1.1 Improve Health of Watersheds, Landscapes, and Marine Resources that are DOI Managed or Influenced in a Manner Consistent with Obligations Regarding the Allocation and Use of Water.
Measure Number/Title	1.1.08: Mined Land Areas &ndash; Number of land acres reclaimed or mitigated from the effects of degradation from past mining.
Data Reported	D1: Report the number of acres of degraded abandoned mine land successfully restored through reclamation or remediation actions.
Scope of the Measure	Acres reflect the footprint of the abandoned mine land area (site or problem area) addressed. Abandoned coal and hard rock (non-coal) mine lands are included.
Point of Contact	WO-360: George Stone (202-557-3573)
Key Term Definitions	• **Abandoned Mine Land :** Land that was mined and left degraded prior to passage of the organic Acts for BLM (pre-FLPMA) and OSM (pre-SMCRA for all priorities). • **Restored:** Land restored includes land reclaimed, stabilized, or improved through remediation techniques that abate, control, or prevent further degradation. • **Degradation** : Surface/groundwater pollution such as from acid mine drainage, clogged streams, contaminated soils, landslides, hazardous materials are examples. • **Reclaimed** : Restored (see above). • **Mitigated** : Temporary or interim measures taken, often due to limited funds. • **Past Mining** : Same as AML (see above). Excludes reclamation performed by mining companies or funded by performance bonds under regulatory programs. • **Effects** : Impacts to human health and safety, flora, fauna, stemming from degradation. For example, polluted water.
Measurement Process	The BLM&rsquo;s Abandoned Mines Information System (AMIS) is used to support the site information and acreage reported for this measure. The sum of the number of acres of degraded abandoned mine land successfully restored through reclamation or remediation actions will be obtained from the AMIS.
Reporting Frequency	Annual. Accomplishments relating to this performance measure will be reported to the DOI on a cumulative basis (i.e., annual accomplishments build upon the accomplishments from previous years).
Reporting Responsibility	National: The WO-360 Group will establish annual targets (in coordination with state/field offices) and report accomplishments related to this performance measure in the Management Information System. (Note: annual targets and annual accomplishments will be entered into the Management Information System--cumulative accomplishments will be reported annually to the DOI).
Baseline	The FY 2004 baseline: 50 acres will be reclaimed/mitigated (cumulative acres reclaimed/mitigated = 50 acres).
Date of Last Change	May 6, 2004
Comments	The BLM state/field offices will annually enter data into BLM&rsquo;s

	AMIS related to this performance measure. This measure coincides with DOI Strategic Plan performance measure: PEM.1.005.

1.1.09

Mission Area	1. Resource Protection
End Outcome Goal	1.1 Improve Health of Watersheds, Landscapes, and Marine Resources that are DOI Managed or Influenced in a Manner Consistent with Obligations Regarding the Allocation and Use of Water.
Measure Number/Title	1.1.09: Restore Fire Adapted Ecosystems/Fire Rehabilitation: Percent of acres degraded by wildland fire with post-fire rehabilitation treatments underway, completed, and monitored.
Data Reported	D1: Total number of degraded burned acres with any ESR activity initiated this fiscal year. D2: Total number of acres burned by unplanned and unwanted wildfires.
Scope of the Measure	Acres burned by wildfire.
Point of Contact	WO-220: Jack Hamby (202-452-7747) / OF&A: Lynne Willoughby (208-387-5568)
Key Terms/ Definitions	• **Unplanned and unwanted fire:** A fire burning outside the parameters as defined in land use plans and fire management plans for that location (including where the fire can be expected to spread) under current and expected conditions. Unplanned and unwanted fires includes fires burning in areas where fire is specifically excluded; fires that exhibit burning characteristics (intensity, frequency, and seasonality) that are outside prescribed ranges, specifically including fires expected to produce severe fire effects; unauthorized human caused fires (arson, escaped camp fires, equipment fires, etc.); and fires that occur during high fire dangers, or resource shortage, where the resources needed to manage the fire are needed for more critical fire management needs. Unplanned is not the same as unscheduled. • **Emergency Stabilization and Rehabilitation (ESR):** The full range of post-fire activities to stabilize, rehabilitate and initiate restoration of fire damaged lands, including protection of public health and safety. • **Degraded:** Any burned acre needing and planned to receive some form of treatment in a given year.
Measurement Process	Total number of acres receiving ESR treatments (includes treatments underway, treatments completed, and treatments monitored). Total number of acres receiving ESR treatment divided by the total number of acres burned by unplanned and unwanted wildfires. Total number of acres monitored for ESR treatment effectiveness divided by the total number of acres burned by unplanned and unwanted wildfires Total number of acres monitored for ESR treatment effectiveness divided by the total number of acres burned by unplanned and unwanted wildfires. Data for data points D1 and D2 will be obtained as outlined below. • Data point D1 will be obtained by summing the following program elements and related subactivities: • JL &ndash; Apply Fire Rehab Treatments; (subactivity 2881)

	• JS &ndash; Stabilize Burned Areas; (subactivity 2822) • Data point D2 information will be obtained from the Fire Reporting System &ndash; 1202.
Reporting Frequency	Quarterly.
Reporting Responsibility	National: Accomplishments for this performance measure will be pulled from two sources: 1) information for data point D1 is a roll-up of program element JL (subactivity 2881) and program element JS (subactivity 2822); and, 2) information for data point D2 will be obtained from the Fire Reporting System &ndash; 1202. The Office of Fire and Aviation will report data for data point D2 to the WO-220 Group. The WO-220 Group will be responsible for establishing and reporting accomplishments in the Management Information System for this performance measure. Data relating to this performance measure will be reported to the DOI on a cumulative basis (i.e., annual accomplishments build upon the accomplishments from previous years).
Baseline	In FY04, the percent of acres degraded by wildland fire with post-fire rehabilitation treatments underway, completed, and monitored is estimated to be 19%.
Date of Last Change	May 6, 2004
Comments	Does not include long-term (over 3 years after containment of fire) ecosystem restoration. States may not be able to provide this data for private lands. This measure coincides with DOI Strategic Plan performance measure: PIM.1.01.001.

1.1.10

Mission Area	1. Resource Protection
End Outcome Goal	1.1 Improve Health of Watersheds, Landscapes, and Marine Resources that are DOI Managed or Influenced in a Manner Consistent with Obligations Regarding the Allocation and Use of Water.
Measure Number/Title	1.1.10: Restore Fire Adapted Ecosystems/Condition Class: Number of total acres in fire regimes 1, 2, or 3 that were identified as high priority through collaboration consistent with the 10-year Implementation Plan moved to a better condition class &ndash; in total.
Data Reported	D1: Total number of acres identified as high priority through collaboration consistent with the 10-year Implementation Plan treated in condition class 2 moved to condition class 1 by fire regime. D2: Total number of acres identified as high priority through collaboration consistent with the 10-year Implementation Plan treated in condition class 3 moved to condition class 1 or 2 by fire regime. D3: Total number of acres treated for hazardous fuels reduction during the fiscal year.
Scope of the Measure	Acres on DOI-managed lands.
Point of Contact	OF&A: Lynne Willoughby (208-387-5568)
Key Terms/ Definitions	• **Hazardous Fuel Treatment:** Any vegetation manipulation and/or removal/modification of wildland fuels to reduce the likelihood of ignition, to reduce potential fire intensity and spread rates, to lessen potential damage and resistance to control, or to limit the spread and proliferation of invasive species. For purposes of this program, the treatment must achieve site-specific fire and resource management objectives under approved land use plans and with full compliance to NEPA and other regulatory statutes. These treatment methods include prescribed fire (and wildland fire use), mechanical treatment, and other types such as biological or chemical and combinations. • **Condition class:** From 2002 Cohesive Strategy in draft & 10-year Implementation Plan. ○ Class 1: For the most part, fire regimes in this Fire Condition Class are within historical ranges. Vegetation composition and structure are intact. There is little risk of losing ecosystem components. Fire is beneficial. ○ Class 2: Fire regimes have been moderately altered from their historical return interval. A moderate risk of losing key ecosystem components has been identified on these lands. ○ Class 3: Fire regimes on these lands have been significantly altered from their historical return interval. Fire frequencies have departed from historical ranges by multiple return intervals. Vegetation composition, structure and diversity have been significantly altered. There is a strong risk of losing key ecosystem components and a significant loss of existing biologic diversity.

- **Fire regime:** A generalized description of the role fire plays in an ecosystem. It is characterized by fire frequency, predictability, seasonality, intensity, duration, scale (patch size), as well as regularity or variability.

We do not imply by selecting 0-35 years as a group that this represents the range of fire return intervals for a specific site. Rather, the group represents a variety of ecosystems that may have different average return intervals, for example, 2-5 years, 10-15 years or 20-35 years. Five combinations of fire frequency, expressed as fire return interval in fire severity, are defined:

Group	Frequency (yrs)	Vegetative Types	Severity	% On Federal Lands
I	0-35	Ponderosa pine, other long needle pine species, and dry site Douglas fir	Low Severity	31%
II	0-35	Drier grassland types, tall grass prairie, and some Pacific chaparral & southern rough ecosystems	Stand replacement	13%
III	35-100	Interior dry site shrub communities such as sagebrush and chaparral ecosystems	Mixed Severity	36%
IV	35-100	Lodgepole pine and jack pine	Stand replacement	14%
V	>200	Temperate rain forest, boreal forest, and high elevation conifer species	Stand replacement	6%

Measurement Process The condition class of the area to receive treatment is to be noted pre-treatment. Upon completion of a treatment activity(ies) conducted in that fiscal year for a specific project, the condition class will be noted post-treatment. Acres meeting the criteria are counted.

Reporting Frequency Annually, because the nature of the science dictates that the condition class

	of acres receiving treatment would be reported on annually since condition class changes may require multiple treatments over multiple years before an actual on-the-ground condition class change may be observed.
Reporting Responsibility	National. This measure will be reported by the OF&A at the National level in FY 2004. Starting in FY 2005, state/field offices will establish annual targets and report annual accomplishments in the Management Information System for this performance measure. Data for all three data points (D1, D2, and D3), will be obtained from the National Fire Plan Operations and Reporting System (NFPORS).
Baseline	The FY 2004 baseline: 31,000 acres treated.
Date of Last Change	May 6, 2004
Comments	• Acres changing condition class via unplanned wildfire are not included. • This measure coincides with DOI Strategic Plan performance measure: PIM.1.01.004. • Data reported under this performance measure will be used to calculate the percent of the total acres treated (% of acres treated reported to the DOI as performance measure 1.1.11). • [100 x ((D1 + D2) / D3)] = % of acres treated for hazardous fuels reduction • Performance Measure 1.1.11 coincides with DOI Strategic Plan performance measure PIM.1.01.005.

1.1.12

Mission Area	1. Resource Protection
End Outcome Goal	1.1. Improve Health of Watersheds, Landscapes, and Marine Resources that are DOI Managed or Influenced in a Manner Consistent with Obligations Regarding the Allocation and Use of Water
Measure Number/Title	1.1.12: Restore Fire Adapted Ecosystems/Condition Class: Number of acres in prior measure (Performance Measure 1.1.10) moved to a better condition class per million dollars of gross investment.
Data Reported	• Total number of acres identified as high priority through collaboration consistent with the 10-year Implementation Plan treated in condition class 2 moved to condition class 1 by fire regime. • Total number of acres identified as high priority through collaboration consistent with the 10-year Implementation Plan treated in condition class 3 moved to condition class 1 or 2 by fire regime. • Total number of acres treated for hazardous fuels reduction during the fiscal year. • Total costs of treatment acres moved from condition class 2 to 1. • Total costs of treatment acres moved from condition class 3 to 1 or 2.
Scope of the Measure	Acres on DOI-managed lands.
Point of Contact	OF&A: Lynne Willoughby (208-387-5568)
Key Terms/ Definitions	• **Hazardous Fuel Treatment:** Any vegetation manipulation and/or removal/modification of wildland fuels to reduce the likelihood of ignition, to reduce potential fire intensity and spread rates, to lessen potential damage and resistance to control, or to limit the spread and proliferation of invasive species. For purposes of this program, the treatment must achieve site-specific fire and resource management objectives under approved land use plans and with full compliance to NEPA and other regulatory statutes. These treatment methods include prescribed fire (and wildland fire use), mechanical treatment, and other types such as biological or chemical and combinations. • **Condition class:** From 2002 Cohesive Strategy in draft & 10-year Implementation Plan. ◦ Class 1: For the most part, fire regimes in this Fire Condition Class are within historical ranges. Vegetation composition and structure are intact. There is little risk of losing ecosystem components. Fire is beneficial. ◦ Class 2: Fire regimes have been moderately altered from their historical return interval. A moderate risk of losing key ecosystem components has been identified on these lands. ◦ Class 3: Fire regimes on these lands have been significantly altered from their historical return interval. Fire frequencies have departed from historical ranges by multiple return intervals. Vegetation composition, structure and diversity have been significantly altered. There is a strong risk of losing key ecosystem components and a significant loss of existing biologic diversity.

	- **Fire regime:** A generalized description of the role fire plays in an ecosystem. It is characterized by fire frequency, predictability, seasonality, intensity, duration, scale (patch size), as well as regularity or variability. - **Gross investment:** All costs associated with these treatments, including cost for treatment planning, environmental and legal pre-clearances, direct on-the-ground activities, program support, and indirect administrative support and overhead
Measurement Process	Results equal total acres from the year's treatment projects that move up at least one condition class, divided by the total dollars in millions spent on treatment
Reporting Frequency	Quarterly.
Reporting Responsibility	National. The OF&A will establish annual targets and report accomplishments in the Management Information System for this performance measure. The number of acres moved to a better condition class will be obtained from performance measure 1.1.10 under the Resource Protection Mission Goal Area. Cost information (full cost), will be obtained from the cost management website via the BLM intranet.
Baseline	The FY 2004 baseline: 1,200 acres per million dollars gross investment.
Date of Last Change	April 19, 2004
Comments	This measure coincides with DOI Strategic Plan performance measure: PIM.1.01.006.

1.1.13

Mission Area	1. Resource Protection
End Outcome Goal	1.1 Improve Health of Watersheds, Landscapes, and Marine Resources that are DOI Managed or Influenced in a Manner Consistent with Obligations Regarding the Allocation and Use of Water
Measure Number/Title	1.1.13: Reduce Hazardous Fuels: Number of total acres treated that are in condition classes 2 or 3 in fire regimes 1 through 3 outside of wildland-urban interface, and are identified as high priority through collaboration consistent with the 10-Yr. Implementation Plan &ndash; in total.
Data Reported	D1: Total number of acres outside the WUI identified as high priority through collaboration consistent with the 10-year Implementation Plan treated in condition class 2 moved to condition class 1 by fire regime. D2: Total number of acres outside the WUI identified as high priority through collaboration consistent with the 10-year Implementation Plan treated in condition class 3 moved to condition class 1 or 2 by fire regime.
Scope of the Measure	Acres on DOI-managed lands.
Point of Contact	OF&A: Lynne Willoughby (208-387-5568)
Key Terms/ Definitions	• **Hazardous Fuel Treatment:** Any vegetation manipulation and/or removal/modification of wildland fuels to reduce the likelihood of ignition, to reduce potential fire intensity and spread rates, to lessen potential damage and resistance to control, or to limit the spread and proliferation of invasive species. For purposes of this program, the treatment must achieve site-specific fire and resource management objectives under approved land use plans and with full compliance to NEPA and other regulatory statutes. These treatment methods include prescribed fire (and wildland fire use), mechanical treatment, and other types such as biological or chemical and combinations. • **Condition class:** From 2002 Cohesive Strategy in draft & 10-year Implementation Plan. ○ Class 1: For the most part, fire regimes in this Fire Condition Class are within historical ranges. Vegetation composition and structure are intact. There is little risk of losing ecosystem components. Fire is beneficial. ○ Class 2: Fire regimes have been moderately altered from their historical return interval. A moderate risk of losing key ecosystem components has been identified on these lands. ○ Class 3: Fire regimes on these lands have been significantly altered from their historical return interval. Fire frequencies have departed from historical ranges by multiple return intervals. Vegetation composition, structure and diversity have been significantly altered. There is a strong risk of losing key ecosystem components and a significant loss of existing biologic diversity. • **Fire regime:** A generalized description of the role fire plays in an ecosystem. It is characterized by fire frequency, predictability, seasonality, intensity, duration, scale (patch size), as well as regularity

	or variability. - **Wildland urban interface (WUI)** : The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. Refer to Federal Register volume 66, no. 3, pages 751-754, January 4, 2001 . Each State may apply a more geographically specific definition of what constitutes WUI to account for difference in fire regimes, condition classes and local environmental and social factors, consistent with the National Association of State Foresters&rsquo; &ldquo;Field Guidance for Identifying and Prioritizing Communities at Risk&rdquo;, June 27, 2003 .
Measurement Process	The condition class of the area to receive treatment is to be noted pre-treatment. Upon completion of a treatment activity(ies) conducted in that fiscal year for a specific project, the condition class will be noted post-treatment. Acres meeting the criteria are counted (D1 + D2).
Reporting Frequency	Quarterly.
Reporting Responsibility	National. The OF&A will be responsible for establishing and reporting accomplishments in the Management Information System for this performance measure. Information for data points D1 and D2 will be obtained from the National Fire Plan Operations and Reporting System (NFPORS).
Baseline	In FY04, the baseline for total acres treated is 225,000 acres.
Date of Last Change	April 19, 2004
Comments	The total acres treated (50%) will be reported under Performance Measure 1.1.14. There is no definition template for Performance Measure 1.1.14. Acres changing condition class via unplanned wildfire are not included. This measure coincides with DOI Strategic Plan performance measure: PIM.1.01.008. Data reported under this performance measure will be used to calculate the percent of all acres treated (performance measure 1.1.14). Acres meeting the criteria in data points D1 & D2 (listed in the Data Reported section above), are divided by the total number of treated acres to determine the percent of all acres treated. Performance Measure 1.1.14 coincides with DOI Strategic Plan performance measure PIM.1.01.009.

1.1.15

Mission Area	1. Resource Protection
End Outcome Goal	1.1 Improve Health of Watersheds, Landscapes, and Marine Resources that are DOI Managed or Influenced in a Manner Consistent with Obligations Regarding the Allocation and Use of Water
Measure Number/Title	1.1.15: Reduce Hazardous Fuels: Number of acres treated outside the wildland-urban interface per million dollars gross investment.
Data Reported	• Total number of acres outside the wildland-urban interface identified as high priority through collaboration consistent with the 10-year Implementation Plan treated in condition class 2 moved to condition class 1 by fire regime. • Total number of acres outside the wildland-urban interface identified as high priority through collaboration consistent with the 10-year Implementation Plan treated in condition class 3 moved to condition class 1 or 2 by fire regime. • Total number of acres treated for hazardous fuels reduction during the fiscal year. • Total costs of treatment acres outside the wildland-urban interface moved from condition class 2 to 1. • Total costs of treatment acres outside the wildland-urban interface moved from condition class 3 to 1 or 2.
Scope of the Measure	Acres on DOI-managed lands outside the wildland-urban interface .
Point of Contact	OF&A: Lynne Willoughby (208-387-5568)
Key Terms/ Definitions	• **Hazardous Fuel Treatment:** Any vegetation manipulation and/or removal/modification of wildland fuels to reduce the likelihood of ignition, to reduce potential fire intensity and spread rates, to lessen potential damage and resistance to control, or to limit the spread and proliferation of invasive species. For purposes of this program, the treatment must achieve site-specific fire and resource management objectives under approved land use plans and with full compliance to NEPA and other regulatory statutes. These treatment methods include prescribed fire (and wildland fire use), mechanical treatment, and other types such as biological or chemical and combinations. • **Condition class:** From 2002 Cohesive Strategy in draft & 10-year Implementation Plan. ◦ Class 1: For the most part, fire regimes in this Fire Condition Class are within historical ranges. Vegetation composition and structure are intact. There is little risk of losing ecosystem components. Fire is beneficial. ◦ Class 2: Fire regimes have been moderately altered from their historical return interval. A moderate risk of losing key ecosystem components has been identified on these lands. ◦ Class 3: Fire regimes on these lands have been significantly altered from their historical return interval. Fire frequencies have departed from historical ranges by multiple return intervals. Vegetation composition, structure and diversity have been significantly altered. There is a strong risk of losing key

	ecosystem components and a significant loss of existing biologic diversity. - **Fire regime:** A generalized description of the role fire plays in an ecosystem. It is characterized by fire frequency, predictability, seasonality, intensity, duration, scale (patch size), as well as regularity or variability. - **Gross investment:** All costs associated with these treatments, including cost for treatment planning, environmental and legal pre-clearances, direct on-the-ground activities, program support, and indirect administrative support and overhead.
Measurement Process	Results equal the number of acres from all the year's treatment projects that move up at least one condition class per each million dollars spent on treatment.
Reporting Frequency	Quarterly.
Reporting Responsibility	National. The OF&A will be responsible for establishing and reporting accomplishments in the Management Information System for this performance measure. The number of acres treated outside of the wildland-urban interface will be obtained from the National Fire Plan Operations and Reporting System (NFPORS). Cost information (full cost) will be obtained from the cost management website on the BLM&rsquo;s intranet.
Baseline	The FY 2004 baseline: 8,100 acres per million dollars gross investment.
Date of Last Change	April 10, 2004
Comments	This measure coincides with DOI Strategic Plan performance measure: PIM.1.01.010.

Mission Area	1. Resource Protection
End Outcome Goal	1.1 Improve Health of Watersheds, Landscapes, and Marine Resources that are DOI Managed or Influenced in a Manner Consistent with Obligations Regarding the Allocation and Use of Water.
Measure Number/Title	1.1.16: Land Contamination: Percent of known contaminated sites remediated on DOI managed land.
Data Reported	D1: Number of known contaminated sites remediated. D2: Number of known contaminated sites.
Scope of the Measure	The scope of this measure includes completed remediation projects relating to the protection of the environment or environmental risk. The number of known sites identified at the beginning of the year becomes the baseline for the rest of the year.
Point of Contact	WO-360: Nancy Dean (202-557-3585)
Key Terms/ Definitions	• **Contaminated site:** Means a defined area that contains contaminants as defined by the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) or the Resource Conservation and Recovery Act (RCRA). • **DOI-managed land:** Means an area that is under DOI&rsquo;s direct jurisdiction and management control. • **Remediated:** Means all the planned and documented response actions for a site have been completed. • **Response action:** Means an activity taken to identify, cleanup, prevent, minimize or mitigate dangers to human health and the environment caused by the release of hazardous substances. An action may include: on- or off-site storage and confinement; perimeter protection using dikes, trenches or ditches; construction of covers or caps; neutralization; diversion, repair or containment of leaking containers; collection of run-off; on-site treatment or incineration; provision of alternative water supplies; monitoring; and permanent relocation of residents. • **Known:** Means a contaminated site that has been identified.
Measurement Process	Percent equals 100 times the quotient of the number of known contaminated sites remediated divided by number of known contaminated sites. [100 x (4 sites / 358 sites)] = 1.1%.
Reporting Frequency	Annual.
Reporting Responsibility	National. The WO-360 Group will establish annual targets and report annual accomplishments in the Management Information System. The state/field offices will enter the number of contaminated sites planned and completed in the Site Cleanup System.
Baseline	The FY 2004 baseline: 358 known contaminated sites.
Date of Last Change	April 14, 2004
Comments	This measure coincides with DOI Strategic Plan performance measure: PIM.1.01.014.

Mission Area	1. Resource Protection
End Outcome Goal	1.2 Sustain Biological Communities on DOI Managed and Influenced Lands and Waters in a Manner Consistent with Obligations Regarding the Allocation and Use of Water.
Measure Number/Title	1.2.01: Percent change from baseline in the number of known acres infested with invasive plant species.
Data Reported	D1: Number of acres in the baseline. D2: Number of acres in the baseline infested with invasive plant species at the beginning of the reporting period. D3: Number of acres in the baseline infested with invasive plant species at the end of the reporting period. (Notes: Number of acres--round up to acre).
Scope of the Measure	This measure includes all land and aquatic habitat targeted for control and/or management. This measure excludes habitat restoration activities occurring after control and management of invasive plant treatment.
Point of Contact	WO-220: Gina Ramos (202-452-5084)
Key Terms/ Definitions	• **Invasive plant species:** As defined in EO 13112 that is 1) non-native (or alien) to the ecosystem under consideration; and, 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health. • **Infested area (North American Weed Management Association (NAWMA) standard):** The number of acres in an area of land and aquatic habitat containing one or more invasive plant species. To determine the extent of acres to report as infested, do the following. An infested area of land is defined by drawing a line around the actual perimeter of the infestation of an individual species of plant as defined by the canopy cover of the plants, excluding the areas not infested. • **Aquatic habitat:** Means any or all wet habitat either fresh water or marine and including wetlands and riparian areas. • **Control & Management:** Means to plan for and conduct eradication, suppression, or management activities that reduce the infestation or prevent the spread of invasive species from infested areas, mitigate effects/ impacts and initiate actions to prevent further introductions and spread. Controlled means eradicated or reduced to a maintenance level. Indications that a maintenance level has been achieved are that periodic control will have to be done less frequently than annually. • **Containment:** Means to control spread of an invasive species from a localized infestation. • **Eradication:** Accomplished when containment of species through monitoring and inventory indicate no additional spread in 5 years. • **Baseline:** Number of known acres infested with invasive plants at a specific point in time.
Measurement Process	Percent change equals 100 times the quotient of the number of acres in the baseline infested with invasive plant species at the beginning of the reporting period and the number of acres in the baseline, minus the quotient of the number of acres in the baseline infested with invasive plant species at the end

	of the reporting period and the number of acres in the baseline. Change from the baseline (total number of acres infested at a point in time) compared to the number of acres controlled, contained, or eradicated.
Reporting Frequency	Annual
Reporting Responsibility	National: In FY04, the WO-220 Group will conduct a data call to the field to obtain the data relating to the following data points: D1: Number of acres in the baseline. D2: Number of acres in the baseline infested with invasive plant species at the beginning of the reporting period. At the end of the fiscal year, the WO-220 Group will conduct a data call to obtain data for data point D3 (the number of acres in the baseline infested with invasive plant species at the end of the reporting period), which will then be used to calculate the percent change from baseline in the number of known acres infested with invasive plant species. The WO-220 Group (in coordination with state/field offices) will establish the annual target for the percent change from baseline in the number of known acres infested with invasive plant species. The WO-220 Group will report annual accomplishments in the Management Information System.
Baseline	The baseline for this performance measure will be established in FY04.
Date of Last Change	April 10, 2004
Comments	Example: A 50-acre riparian unit in an area is occupied by multiple weed species including, Tamarisk, Russian Olive, and Russian Knapweed. Because these species are so heavily intermixed it is extremely difficult to obtain actual measurements for each species. In this case, the park uses the 50 acre unit as a gross area and then approximates the area of canopy for each species as follows: Tamarisk 45% canopy cover; Russian Olive 35% canopy cover; Russian Knapweed 38% canopy cover. (NOTE: Total canopy cover by all three species can be more than 100% if there is overlap in the area of ground covered by the foliage of more than one species. Although having more than 100% cover may seen confusing, it is standard practice when monitoring plant populations. This is a NAWMA mapping standard that has been agreed upon by most of the DOI agencies that are involved in invasive plant issues. Please refer to the NAWMA web site (www.NAWMA.org) for more information. The estimated area of infestation within the 50 acre gross area is then calculated and entered into the &ldquo;Infested Area&rdquo; data field as a separate entry to each species: Tamarisk 45% of 50 acres or 22.5 acres of infestation; Russian Olive = 35% of 50 acres or 17.5 acres infestation; Russian Knapweed = 38% of 50 acres or 19 acres of infestation.

	This measure coincides with DOI Strategic Plan performance measure: PEM.2.004.

Mission Area	1. Resource Protection
End Outcome Goal	1.2. Sustain Biological Communities on DOI Managed and Influenced Lands and Waters in a Manner Consistent with Obligations Regarding the Allocation and Use of Water.
Measure Number/Title	1.2.02: Threatened & Endangered Species: Percent of plant/animal species listed or proposed for Endangered Species Act (ESA) listing achieving a stable or increasing trend in their resident populations.
Data Reported	D1: Number of plant/animal species listed, or proposed for ESA listing achieving a stable or increasing trend in their resident populations. D2: Total number of plant/animal species listed, or proposed for listing under the ESA.
Scope of the Measure	Scope of this measure includes all populations listed, or proposed for listing under the Endangered Species Act (ESA), which reside partially or totally on BLM-administered lands. Refer to the annual Fish and Wildlife data call for ESA expenditures to define the number of populations occurring within a specified administrative area (district or field office).
Goal Leads(s)	
Data Point of Contact	WO-230: Peggy Olwell (202-452-7764)
Key Terms/ Definitions	• Stable population: A stable population is one in which either individuals, or groups of individuals representing a population segment (or site) have ceased a downward trend, and are maintaining current numbers. • Increasing trend: An increasing trend is represented when individual numbers, or population segments are rising above previously measured levels. • Data collection:
Measurement Process	Percent equals 100 times the quotient of the number of plant/animal species listed, or proposed for ESA listing, achieving a stable or increasing trend in their resident populations (data point D1), divided by the total number of plant/animal species listed, or proposed for listing under the ESA (data point D2). 100 x (D1/D2) = %.
Reporting Frequency	Annual
Reporting Responsibility	State (Field)
Baseline	FY04:
Date of Last Change	April 10, 2004
Comments	This is a BLM-specific performance measure. Data collection guidelines: • Population status will be determined for those populations resident to BLM lands. • Where BLM-derived data are not available, population status will need to be ascertained through partnership with other agencies, such as the US Fish & Wildlife Service. • For the purposes of consistency, any site established for monitoring species populations will be considered a population (e.g., 180 bald

		eagle sites monitored is a more accurate reflection of the work, rather than reporting 1 population of bald eagles; 3 smolt traps in a basin to monitor Chinook salmon are counted as 3 sites, and hence 3 populations.

Mission Area	1. Resource Protection
End Outcome Goal	1.2. Sustain Biological Communities on DOI Managed and Influenced Lands and Waters in a Manner Consistent with Obligations Regarding the Allocation and Use of Water.
Measure Number/Title	1.2.03: Habitat Restoration: Number of in-stream or shoreline miles restored or enhanced to achieve habitat conditions to support species conservation consistent with approved management documents, program objectives.
Data Reported	D1: Number of in-stream or shoreline miles restored or enhanced for species habitat. Supporting Data: • Number of species of management concern. • Number of species for which activities have been conducted in support of habitat restoration, or enhancement which can be measured in acres, during the reporting period.
Scope of the Measure	Species with approved management documents (or specifically included in other forms of management documents) that include criteria for determining the level at which a species may be considered self-sustaining, except species that have been Federally listed as threatened or endangered for a decade or more, candidate or proposed species or invasive species. For purposes of this measure each in-stream or shoreline mile may be counted only once despite the fact that more than one species may benefit and be counted in the measurement process. In-stream or shoreline miles restored or enhanced, includes habitat restoration activities on both DOI and DOI-influenced lands.
Goal Leads(s)	
Data Point of Contact	WO-230: Peggy Olwell (202-452-7764)
Key Terms/ Definitions	• **Species of Management Concern** : Any species subject to management by the Department due to statutory or programmatic responsibility and that has an approved management document. • **Approved Management Document** : Any written plan or other document approved, endorsed, or supported by the Department that establishes or authorizes activities designed to manage species to self sustaining levels. This term is meant to be interpreted broadly, to include documents used to accomplish the Department&rsquo;s mission (e.g., grants, damage assessment plans, species management plans, etc.). • **Activities** : All actions undertaken by Bureaus to bring species to self-sustaining levels, including, but is not limited to, research, monitoring, the evaluation of permit or license conditions or conservation measures as well as habitat protection, restoration, enhancement, replacement, population augmentation, reintroduction and other population manipulations, as well as actions taken in

	consultation with Tribal governments or in compliance with International agreements. - **Managed to Self-sustaining levels** : To take or influence activities meet one or more species objectives specified in approved management documents. - Self-sustaining: A population which is capable of maintaining itself by independent effort; the genetic complement is sufficient and habitat requirements are met without further human intervention. - **In-stream** : Waters within the confined width and depth of a flowing watercourse; at or below bank-full conditions; flows not impeded by over-bank obstructions or flood plain vegetation. - **In-stream Restoration** : The manipulation of the physical, chemical, or biological characteristics of a site with the goal of retuning full functions to former or degraded in-stream aquatic habitats. Example: returning meanders and sustainable profile to a channelized stream. - **In-stream Enhancement** : The manipulation of the physical , chemical, or biological characteristics of a site with the goal of retuning full functions to former or degraded in-stream aquatic habitats. Example: Placement of structures in a stream channel to increase habitat diversity- spawning logs, lunker structures, etc. - **Shoreline** : The linear extent of riparian zone which forms the transition between in-stream and upland habitats. This area may be vegetated or not vegetated. Shoreline miles are measured independently on each side of a watercourse.
Measurement Process	Sum of total number of stream/shoreline miles restored or enhanced.
Reporting Frequency	Annual
Reporting Responsibility	State (Field)
Baseline	FY04: 585 stream/shoreline miles.
Date of Last Change	April 10, 2004
Comments	This measure coincides with DOI Strategic Plan performance measure: PIM.2.01.002.

Mission Area	1. Resource Protection
End Outcome Goal	1.2. Sustain Biological Communities on DOI Managed and Influenced Lands and Waters in a Manner Consistent with Obligations Regarding the Allocation and Use of Water.
Measure Number/Title	1.2.04: Habitat Restoration: Number of acres restored or enhanced to achieve habitat conditions to support species conservation consistent with approved management documents, program objectives.
Data Reported	D1: Number of acres restored or enhanced for species habitat. Supporting Data: • Number of species of management concern. • Number of species for which activities have been conducted in support of habitat restoration, or enhancement which can be measured in acres, during the reporting period.
Scope of the Measure	Species with approved management documents (or specifically included in other forms of management documents) that include criteria for determining the level at which a species may be considered self-sustaining, except species that have been Federally listed as threatened or endangered for a decade or more, candidate or proposed species or invasive species. For purposes of this measure each acre may be counted only once despite the fact that more than one species may benefit and be counted in the measurement process. Note: Not all approved species management documents have self-sustaining population numbers as targets.
Point of Contact	WO-230: Peggy Olwell (202-452-7764)
Key Terms/ Definitions	• **Species of Management Concern** : Any species subject to management by the Department due to statutory or programmatic responsibility and that has an approved management document. • **Approved Management Document** : Any written plan or other document approved or endorsed by the Department that establishes or authorizes activities designed to manage species to self-sustaining levels. This term is to be interpreted broadly, to include documents used to accomplish the Department&rsquo;s mission (e.g., grants, damage assessment plans, species management plans, etc.). • **Activities** : All actions undertaken by Bureaus to bring species to self-sustaining levels, including, but is not limited to, research, monitoring, the evaluation of permit or license conditions or conservation measures as well as habitat protection, restoration, enhancement, replacement, population augmentation, reintroduction and other population manipulations, as well as actions taken in consultation with Tribal governments or in compliance with International agreements. • **Managed to Self -sustaining levels:** To take or influence activities meet one or more species objectives specified in approved management documents.

	- **Self -sustaining:** A population which is capable of maintaining itself by independent effort; the genetic complement is sufficient and habitat requirements are met without further human intervention. - **Restored** : Returning the quality and quantity of habitat to some previous condition, often some desirable historic baseline considered suitable to support healthy, self-sustaining populations of fish, wildlife and/or plants. - **Enhanced** : Improving the quality of habitat that was previously destroyed, converted, or degraded (in whole or in part), for one or more species. Enhancement generally refers to an effort of lower intensity than restoration. OR - **Enhanced:** Improving habitat through alteration, treatment, or other land management practice, to increase habitat value for one or more species without bringing the habitat to fully restored or naturally occurring condition. - **Adequate Population Information:** Information on the status or trends of populations that has sufficient credibility to serve as a basis for undertaking management actions is needed for many Species of Management Concern.
Measurement Process	Sum of the total number of acres restored or enhanced.
Reporting Frequency	Annual
Reporting Responsibility	State (Field)
Baseline	FY04: 9,500 acres.
Date of Last Change	March 15, 2004
Comments	This measure coincides with DOI Strategic Plan performance measure: PIM.2.01.001.